PETITION

NOW COMES, Providence Piers, LLC, and hereby Petitions the Honorable City Council of the City of Providence, Rhode Island for abatement of the Public Nuisance located at 242 Allens Avenue. Providence Piers, LLC ("Providence Piers") is the owner of a parcel of property and buildings located at 200 Allens Avenue, Providence, RI, and which abuts the SMM New England Corporation's ("SMM") property located at 242 Allens Avenue, Providence, RI. We hereby submit the within petition for your consideration.

I. Background

When approaching the great City of Providence (the "City") from the south on Interstate Route 95and U.S. Route 1, for the last 4 years, motorists have been greeted by the sight of 2 obvious landmarks. One is the Big Blue Bug, an amusing and innocuous marketing tool, and the other, a rusty carbuncle on the face of the City: the hulking mountain(s) of unsightly scrap metal maintained by SMM at 242 Allens Avenue. *See* Attachment A. SMM is owned by Sims Metals Management, a worldwide conglomerate that is the World's largest scrap metal dealer. As such, SMM cares little about the City and any effects it may have on the citizenry and Narragansett Bay; it has hundreds of locations all over the world and profits in the billions of dollars. It has been fined numerous times by Governmental regulatory agencies for pollution and casually shrugs off the millions of dollars in penalties assessed. *See* Attachment B.

Although the Providence waterfront contains various industrial uses and other metal recycling operations, no other use of the waterfront even approaches the magnitude of SMM's noxious assemblage of scrap metal. Not only is the mountain of junk an eyesore, in derogation of federal and state law as set forth *infra*, it is also a grave Public Health and Safety risk which must be abated; for both the health and safety of the citizens of the City, and also for the economic well-being of the City.

II. SMM Duped the City

SMM began operations in October 2011 at 242 Allens Avenue well before it was even licensed by the City to do so and against the recommendations of the City Fire Department's Plan Reviewer, who, after visiting the already operating facility became concerned, in terms of fire protection, about the magnitude and height of the gigantic stockpiles of scrap metal being maintained. *See* Attachment C. A fact that SMM likes to conceal is the numerous scrap pile fires that have plagued the unfortunate cities where its facilities are located, including but not limited to Jersey City, New Jersey; Redwood City, California; Hayward, California; Fairless Hills, Pennsylvania; West Point, Mississippi; Perth, Australia and Birmingham, England. *See* Attachment D. Indeed, right before Christmas of 2014, SMM's Johnston, RI automobile shredding facility caught fire, which required multiple city and town fire departments to extinguish. *See* Attachment E. The stockpile at 242 Allens Avenue is mere feet from the Providence Piers Building complex immediately to the north and within yards of the Providence Community Health Center. *See* Attachment F.

SMM also misrepresented the intended use of the property as primarily just a continuance of the prior use as a ship repair yard in order to dupe the City into giving its blessing under the zoning code. *See* Attachment G. Although Providence Pier's Property and the SMM Property uses are both allowed pursuant to the W-3 zoning district in which they are both located, it is also a well-recognized principle of R.I. law that compliance with a zoning ordinance does not immunize a person from the consequences of his making an unreasonable use of his land whereby he invades the private rights of his neighbor. *DeNucci v. Pezza*, 329 A.2d 807, 809 (RI 1974). To hold otherwise would be tantamount to allowing a regulatory agency to license a nuisance. *Id*.

III. There is No Real Benefit to the City from SMM's presence

In order to deflect criticism, SMM has spread falsehoods regarding its nature as a "green" industry and the number of jobs that its operations within the City provide. However, under oath of perjury, SMM has admitted that normally there are only 5 employees, all non-union, working at any given time at the 242 Allens Avenue scrapyard. *See* Attachment H. Although this number may increase when a ship is being loaded, it is temporary at best, and is for 1-3 days every 2-4 months. That is a far cry from the exaggerated employment numbers being used to dupe the general public and public officials into the belief that the 242 Allens Avenue SMM operation is vital to the economy of the City. Nothing could be further from the truth. As will be shown *infra*, the SMM operation will actually have the opposite effect, both because of the ugly image it presents and because of the slow and painful health effects that the operations will surely visit upon any person that is exposed to the cancer-causing dust created by the operation.

IV. SMM's Operations are both a Public and Private Health and Safety Risk

A. SMM is a Private Health and Safety Risk

Perhaps no one is as familiar with the Public Health and Safety risk of the SMM operation at 242 Allens Avenue as Providence Piers. Providence Piers is a mixed-use development site, which offers artists and commercial tenants office space for various uses. The Providence Piers Building is listed on the National Register of Historic Places and also the State and local historic registers as well. SMM came to their current location at 242 Allens Avenue in 2011, long after Providence Piers had spent nearly seven (7) million dollars, subsidized in part by tax credits, rehabilitated the old derelict City Tire Building and rented space to tenants, creating a burgeoning colony of artists, craftsmen and small business.

In the years that have passed since SMM began operations at 242 Allens Avenue, Providence Piers has lost virtually all of its tenants due to fugitive dust infiltrating the building, noise, vibrations and because of structural damage sustained, all due to SMM's reckless business practice of stockpiling tens to hundreds of thousands of tons of scrap metal upon land that is comprised of loose fill material. Materials from the enormous piles have even rolled off and struck the building, breaking windows and in one particularly disturbing case, struck an employee of a tenant. *See* Attachment I.

Engineers retained by both Providence Piers and its former insurance carrier have concluded, to a reasonable degree of engineering certainty, that damage to interior and exterior walls and concrete floors in the one- and two-story additions at Providence Piers was caused by substantial differential settlement that has occurred since the change in use and operations at the adjacent scrap metal recycling facility in 2011. The initial operations were conducted on **bare ground** with no concrete pad. They have also found that the differential settlement induced by the adjacent scrap metal recycling facility resulted from the placement of tall mounds of scrap metal along the concrete block wall near the property line and that the zone of influence creating settlement extends a considerable distance beyond the mound and onto the Providence Piers property. In addition, Engineers found that vibrations induced by construction equipment at the adjacent SMM facility has caused additional differential ground settlement because some of the upper 14 feet of sand and gravel is very loose to loose and therefore susceptible to densification as a consequence of ground vibrations. Because of the damage done, the Engineers have opined that if the differential movement continues, catastrophic failure of the block walls immediately adjacent to the SMM site is an unacceptable probability. On recent revisits, Engineers have observed that the SMM stockpile currently contains more shredded material than that observed on previous site visits. This addition of extra weight over and above that present since the beginning of the SMM operation in late 2011 is now causing a drastic acceleration of the differential settlement. This drastic acceleration of damage has reinforced the Engineer's opinion that the complete southernmost wall of the Providence Piers additions is in danger of collapsing and may need to be demolished and reconstructed.

B. SMM is a Public Health and Safety Risk

Besides the on-going damage to this privately owned and Nationally recognized historic property at Providence Piers, and still even more concerning, is the fact that SMM is operating a metal recycling facility that posed, and still poses, a grave health risk to those persons in the Providence Pier's building and also to all neighboring properties and persons due to the toxic dust it creates.

It is the goal of this Petition that the City Council put an end to SMM being a public nuisance, which in turn will clean up the debris along Allens Avenue, and stop the intolerable discharge of dust and debris from its burgeoning pile of scrap. The situation with SMM is a true public health emergency. The R.I. Hospital Medical complex, the Women and Infants Hospital Complex, and Hasbro Children's Hospital are within one quarter to one half mile down wind from the SMM operation. Many employees of the various medical complexes remotely park within feet of the noxious SMM operation.

The SMM operation is within mere yards of the Providence Community Health Center. Providence Community Health Centers is headquartered across the street from SMM, with its administrative offices and 12,000 square foot Chafee Health Center in close proximity. They offer comprehensive primary and specialty health care services to thousands of Providence residents at this site, which is vital to the health and well-being of adults and children throughout the city.

Since SMM arrived in the fall of 2011, the quality of life for Providence Community Health Center's patients, employees, and visitors to the facilities has been greatly diminished. Aside from the obvious problems of increased noise pollution and the unsightliness of the mountain of scrap towering over Allens Avenue, the operation at SMM is a real health and safety concern. Dust and debris inundate the airspace around the immediate vicinity of SMM and the health center. Providence Community Health Center has also received a growing number of complaints from staff that has endured flat tires on their vehicles from the growing amount of metal pieces and scrap lying on the street.

As an organization that has worked so hard to promote the health and well-being of Providence residents, particularly those who live in poverty and have no health insurance, the continued operation of Sims threatens the very mission of the Health Center. Patients and staff deserve to live and work in an area that is not diminished by a public nuisance like Sims. They also deserve to breathe air that is not filled with dust particles and debris or be subject to pieces of metal and scrap all along the street.

C. Dust from SMM Poses a Grave Public Health Hazard

In October of 2013, Providence Piers hired OHI Engineering and Environmental Consultants ("OHI") to conduct an environmental survey of the Providence Piers and SMM Properties for the purpose of sampling metals in dust and soil in and around the scrap metal piles that are located on SMM's Property, and to sample metals in dust and soil located on the roof and inside the building at the Providence Piers Property. Throughout this Petition, all data referenced is from OHI's findings. *See* Attachment J.

Upon reviewing OHI's findings, it is evident that SMM's operations has caused toxic levels of metals to be introduced to the Providence Piers Property and surrounding environs. OHI was able to determine that toxic metals and fugitive dust became airborne and traveled across SMM's Property and onto the Providence Piers Property during periods when the wind was from its usual southerly direction. The metals found in the test samples are hazardous and qualitative similarities provide evidence that the soil and dust at the two locations are from the same source.

Approximately twenty-two (22) metals were tested in the seven (7) samples taken on the roof of the Providence Piers building and the one dust sample taken from a window sill inside the Providence Piers building. Sixteen (16) metals were found in the samples analyzed, and of the sixteen (16) metals found on the roof of the Providence Piers building, all sixteen (16) were found in the samples collected at the base of the SMM scrap pile. The metals found at both properties were: Aluminum, Arsenic, Barium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Vanadium, and Zinc. A quantitative result for Mercury was not obtained in the Providence Piers samples because of laboratory analytical limitations.

When conducting the survey at SMM's Property, approximately twenty-three (23) metals were tested for presence in the four (4) samples taken around the base of the SMM scrap metal pile. In each of the four (4) samples, all twenty-three (23) metals were found. The metals found

were: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium and Zinc. The predominate metals found at both sites were compared to determine if the relative amounts of each of the common metals were similar. Table 1, demonstrates the substantial correlation.

TABLE 1. Predominant Metals

Metal Tested in Sample	242 Allens Avenue	200 Allens Avenue
Iron	69%	57%
Calcium	17%	18%
Aluminum	5.0%	8.3%
Zinc	3.1%	3.6%
Magnesium	2.1%	4.1%
Potassium	0.8%	3.1%
Lead	0.7%	0.8%
Sodium	0.7%	3.5%
Manganese	0.6%	0.6%
Copper	0.5%	0.7%
Chromium	0.1%	0.1%
Nickel	0.1%	0.1%

OHI then compared the metals found at the SMM Property to metals found in soils from Common Anthropogenic Sources. These results are found in Table 2.

TABLE 2: Results of Metals Found in Soils from Common Anthropogenic Sources; 242 Allens Avenue

Metal	**Natural Soil Mg/Kg**	**SMM Scrap Pile Mg/Kg**
Iron	200 to 2000	140,000
Aluminum	1500	9600
Zinc	6.2	6300
Manganese	43	1200
Copper	1.0	960
Cadmium	1.0 (0.1-1.8)	28
Nickel	1.2-216 avg. 28	231
Lead	400	1433

Notes:
Iron concentration is considerably higher than normal urban soils.
Zinc concentration is ten times the concentration in normal urban soils.
Cadmium concentration is high compared to urban soils
Nickel concentration is elevated compared to normal urban soils.
Lead concentration in urban soil is typically under 400 parts per million (mg/Kg).

Table 3 reflects the percentage of these metals in the soil and dust collected at the SMM and Providence Piers Properties.

TABLE 3: Percentages of Anthropogenic Metals at 242 and 200 Allens Avenue

Metal Tested in Sample	242 Allens Avenue	200 Allens Avenue
Iron	69%	57%
Aluminum	5.0%	8.3%
Zinc	3.1%	3.6%
Lead	0.7%	0.8%
Manganese	0.6%	0.6%
Copper	0.5%	0.7%
Nickel	0.1%	0.1%
Cadmium	<0.1%	<0.1%

Tables 2 and 3 demonstrate that the concentrations of the metals from the SMM scrap pile are significantly higher than those found in normal urban soil. In addition, they are quantitatively similar at both property locations tested. The evidence further supports the conclusion that the source of soil and dust at the Providence Piers Property is the scrap metal pile on the SMM Property.

The Environmental Protection Agency considers a concentration of Lead in soil between 200 and 400 mg/kg to be moderately high. The level of lead detected in the SMM scrap metal soil and dust samples was 1433 mg/kg. In addition, OHI took a dust sample from a southerly facing window of a former restaurant located in the Providence Piers building. The amount of lead found in the window sill sample exceeded the allowable EPA abatement clearance limit. Table 4 provides this result.

TABLE 4: Lead Content in Indoor Dust, 200 Allens Avenue

Location	Lead Concentration	EPA Allowable Limit
Window Sill Dust Inside 200 Allens Avenue Building	13680 ug/ft^2	250 ug/ft^2

The concentrations of lead in soil at the SMM Property and the dust on the interior window sill at the Providence Piers building are both elevated for Lead. The window sill sample exceeds the EPA clearance limit for re-occupancy of a residence following abatement. The toxic dust entered the building through cracks and structural damage caused by the massive weight and vibrations emanating from the SMM operations.

A soil and dust sample was taken off the roof of the Providence Piers Building and was analyzed for Cadmium, Iron, Lead, and Mercury. These results were compared to the sample results taken at the base of SMM's scrap pile on their property. Table 5 provides these results.

TABLE 5: Comparative Summary of 200 Allens Avenue Roof and 242 Allens Avenue HMS Scrap Pile

Metal Tested in Sample	200 Allens Avenue	242 Allens Avenue (Average and Range)
Cadmium	19 mg/kg	27.9 mg/kg (19.8 – 40)
Iron	110,000 mg/kg	139250 mg/kg (107,000 – 184,000)
Lead	1100 mg/kg	1433 mg/kg (1060 – 1940)
Mercury	2.3 mg/kg	6.89 mg/kg (3.69 – 15.1)

Cadmium is classified as a Class B1 Carcinogen by the EPA and Cadmium compounds are classified as human carcinogens by several regulatory agencies. The most convincing data that cadmium is carcinogenic in humans comes from studies indicating occupational cadmium exposure is associated with lung cancer. Cadmium exposure has also been linked to human prostate and renal cancer. *See* Attachment K.

Per the World Health Organization, Cadmium exerts toxic effects on the kidney, the skeletal system and the respiratory system. It is generally present in the environment at low levels; however, human activity has greatly increased those levels. Cadmium can travel long distances from the source of emission by atmospheric transport. It is readily accumulated in many organisms, notably molluscs and crustaceans. This is particularly alarming considering the proximity of the SMM operation operating right on the shore of Narragansett Bay. The World Health Organization states that national, regional and global actions are needed to decrease global environmental cadmium releases and reduce occupational and environmental exposure. *See* Attachment L.

A thorough review of the reports generated by OHI demonstrates there is significant evidence that the dust on the roof and inside the Providence Piers Building is fugitive dust that was generated from SMM's recycling operations. The qualitative and quantitative profiles of the soils and dust at the two Properties are similar and, it is highly likely that the wind patterns have caused the fugitive dust from SMM's operations to travel onto the Providence Piers Property. Accordingly, SMM is in violation of the Rhode Island Department of Environmental Protections ("RIDEM") Air Pollution Control Regulation 5, Fugitive Dust. In fact on June 19, 2014, the R.I. Department of Environmental Management issued a Notice of Violation to SMM for violation of this regulation. SMM's response was to simply spray water onto the piles, which now simply captures the dust and the droplets of contaminated water are carried by the wind.

The fugitive dust that has been detected is considerably hazardous and presents a danger to all in the vicinity, including SMM's employees, Healthcare workers and Patients. This dust, depending on wind direction, is being blown into East Side and Fox Point neighborhoods in addition to the Hospital area, Downtown and South Providence. Pleas to State regulatory agencies have resulted in little action, therefore we turn to you, the elected governing body of the City in which this grave public nuisance exists to abate this Public Health emergency.

D. The 242 Allens Avenue Facility is an Eyesore and contrary to Federal/State law

In regard to the negative aesthetic effect of the 242 Allens Avenue stockpile on the City, it is clear that RIDOT, through 23 CFR § 751.9(a)(4), RI Gen. Laws 24-14-1, *et seq.* and RIDOT Regulations 61-1-11, *et seq.*, is a regulatory authority with jurisdiction regarding the SMM NE Junk facility. *See* Attachment M. The 242 Allens Avenue site is well within 1000 ft. of Interstate Route 95. Because of the proximity to Rte. 95, by statute and regulation 61-1-11:IV, the 242 Allens Avenue site is required to be adequately screened so that ***no portion of the operation is visible from the main traveled way of the Interstate***. However, that is not the case, and it has not been for more than 4 years. Since its inception in October 2011, the scrap metal pile has reached towering heights and was, and is still, clearly visible from main traveled part of Rte. 95, despite the miniscule and totally inadequate screening effort at the site. Inaction in regard to 242 Allens Avenue could very well jeopardize sorely needed federal highway funds for the State of Rhode Island and the City.

As stated previously, it is the goal of this Petition that the City Council put an end to the 242 Allens Avenue SMM operation as being a public nuisance, which in turn will clean up the debris along Allens Avenue, and stop the intolerable discharge of dust and debris from its burgeoning pile of scrap, much of which comes from the stripping and vandalizing of vacant houses and buildings. The fugitive dust that has been detected is considerably hazardous and presents a danger to all in the vicinity, including SMM's own employees, Healthcare workers and Patients. Pleas to State regulatory agencies have resulted in little action, therefore we turn to you, the elected governing body of the City in which this grave public nuisance exists to abate this Public Health emergency. Healthcare facilities like Women and Infants, and Rhode Island Hospital, and institutions like Brown University – all of which have foot prints in the nearby area – would be far more likely to expand if the nuisance is abated. The hospitals and universities are the backbone of the City's economy and provide real and good paying jobs. Further industrial and Business growth along the waterfront is also stunted by the presence of the 242 Allens Avenue SMM operation, as no responsible business would locate in the vicinity of such a grave health hazard and aesthetic nightmare as that which can be clearly seen from Interstate Route 95 and U.S Route 1.

THEREFORE, the undersigned respectfully Petition the Honorable City Council of the City of Providence, Rhode Island for abatement of the Public Nuisance located at 242 Allens Avenue.

Peter V. Conley Manager
Providence Piers, LLC

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Redwood City: Metal recycling facility to pay $2.4 million to settle civil case

By Jason Green *Daily News Staff Writer*

POSTED: 11/25/2014 07:13:34 AM PST | UPDATED: 3 MONTHS AGO 0 COMMENTS

Sims Group USA will pay nearly $2.4 million to settle a civil case stemming from an investigation of its Redwood City metal recycling facility by the California Department of Toxic Substances Control.

Announced on Monday, the agreement follows a six-figure fine the U.S. Environmental Protection Agency recently imposed on the firm for allowing toxic metal dust to blow into the Bay.

The probe by the Department of Toxic Substances Control centered on the release of "light fibrous material," or LFM. Easily airborne, the dryer-lint-like substance is created when small bits of upholstery, carpets and other fabric components of cars and other scrap metal items are processed.

The state agency found the material as far as 2,000 feet away from the facility at 699 Seaport Blvd., according to its chief counsel, Reed Sato. Nearly all of the samples collected contained levels of cadmium, copper, lead and zinc that exceeded hazardous material regulatory thresholds.

There was, however, a low risk to the public because the material was not concentrated in any one area, Sato said.

A civil complaint filed in San Mateo County Superior Court by the California Attorney General's Office on behalf of the Department of Toxic Substances Control alleged that Sims had violated the state's hazardous waste control law by allowing the material to escape the confines of its 13-acre facility.

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Ships bound for the Far East load scrap metal. (Courtesy U.S. Environmental Protection Agency)

BAY AREA NEWS GROUP

(/portlet/article/html/imageDisplay.jsp?contentItemRelationshipId=6416594)

The settlement calls for Sims to pay roughly $1.44 million to upgrade its facility beyond current regulatory requirements, as well as $825,000 to the Department of Toxic Substances Control for civil penalties and the cost of its investigation. The California Environmental Protection Agency will also receive $125,000 for its environmental enforcement and training account program.

"The goal of this enforcement is to protect the surrounding communities by requiring Sims to enhance the control of LFM from its facility and prevent accumulation of hazardous waste offsite," Sato said.

The upgrades, which include enclosing a metal shredder mill and other pieces of metal separation equipment, will build on several others Sims has made to control the release of the material.

"Well before reaching this agreement, Sims already had implemented extensive best management practices to control LFM from its operations, but agreed as part of the settlement to implement additional control measures," Sims Group USA said in a statement about the settlement.

Until the upgrades are complete, Sims will be required to conduct weekly inspections to determine whether the material is accumulating on private and public property near the facility.

Although it agreed to the settlement, Sims did not admit to any of the allegations in the complaint. In fact, the firm maintained in its statement that light fibrous material is not a waste product and

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, California 94105

IN THE MATTER OF:	)	Docket No. CWA 309(a)-12-002
	)	
	)	
Sims Group USA Corporation	)	**FINDINGS OF VIOLATION,**
dba Sims Metal Management	)	**ORDER FOR COMPLIANCE, AND**
699 Seaport Blvd.	)	**REQUEST FOR INFORMATION**
Redwood City, CA 94603	)	
	)	
	)	Proceedings under Sections 308(a) and 309(a)
	)	of the Clean Water Act, as amended, 33
	)	U.S.C. Sections 1318(a), and 1319(a)

STATUTORY AUTHORITY

The following Findings of Violation, Order for Compliance, and Request for Information (Order) issued pursuant to the authority vested in the Administrator of the U.S. Environmental Protection Agency (EPA) by Sections 308(a) and 309(a)(3), (a)(4), and (a)(5)(A) of the Clean Water Act, as amended (the Act or CWA), 33 U.S.C. §§ 1318(a), and 1319(a)(3), (a)(4), and (a)(5)(A). This authority has been delegated to the Regional Administrator of EPA, Region 9 and re-delegated by the Regional Administrator to the Director of the Water Division of EPA, Region 9. Notice of this action has been given to the State of California.

FINDINGS OF VIOLATION

1. Section 301(a) of the Act, 33 U.S.C. § 1311(a), prohibits the "discharge of any pollutant by any person" into waters of the United States, except, inter alia, in compliance with a permit issued by EPA or an authorized state pursuant to Section 402 of the Act, 33 U.S.C. § 1342.

2. Section 402(p) of the Act, 33 U.S.C. § 1342(p), and EPA's implementing regulations at 40 C.F.R. § 122.26, require NPDES permit authorization for discharges of storm water associated with industrial activity. Facilities engaged in industrial activity, as defined by 40 C.F.R. § 122.26(b)(14), must obtain NPDES permit authorization if they discharge or propose to discharge storm water into waters of the United States. Pursuant to 40 C.F.R. §§ 122.26(a)(1)(ii) and 122.26(c), dischargers of storm water associated with industrial activity are required to apply for an individual permit or to seek coverage under a promulgated storm water general permit.

3. Scrap metal recycling falls under SIC Major Group 50 and pursuant to 40 C.F.R. §

122.26(b)(14)(xi) is an industrial activity subject to the storm water discharge and permitting requirements under Section 402(p) of the Act, 33 U.S.C. § 1342(p).

4. Section 308(a) of the Act, 33 U.S.C. § 1318(a), and its implementing regulations authorize EPA to, inter alia, require the owner or operator of any point source to establish records, make reports, or submit other reasonably required information, including individual and general NPDES permit applications. See also 40 C.F.R. § 122.21.

5. The State of California has an EPA-approved NPDES program and issues permits, including storm water permits, through its State Water Resources Control Board (State Board) and nine Regional Water Quality Control Boards (Regional Boards). The permit that is currently effective, General Permit No. CAS000001 for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities, Water Quality Order No. 97-03-DWQ (General Permit), was adopted on April 17, 1997.

6. The General Permit requires facility operators to develop and implement a storm water pollution prevention plan (SWPPP) prior to commencing industrial operations. (General Permit, Section A.1 and 2, pgs. 11-12.) The SWPPP's purpose is to identify sources of industrial storm water pollution and to identify and implement site-specific best management practices (BMPs) to control discharges. Id.

7. The General Permit requires the SWPPP to include, inter alia, a narrative description of the facility's industrial activities (General Permit, Section A.6. pp. 14-16), an assessment of all industrial activities and potential pollutant sources at the facility (General Permit, Section A.7, pp. 16-17), and a narrative description of the storm water BMPs to be implemented at the facility for each potential pollutant and its source (General Permit Section A.8, pg. 17), as well as a site map (or maps) that identifies: (a) facility boundaries and an outline of facility drainage areas, (b) the storm water collection and conveyance system, (c) an outline of impervious areas, (d) locations where materials are directly exposed to precipitation, and (e) areas of industrial activity. (General Permit, Section A.4, pgs. 12-14.)

8. The General Permit requires facility operators to reduce or prevent pollutants associated with industrial activity in storm water discharges and authorized non-storm water discharges using best available technology economically achievable (BAT) for toxic pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. (General Permit, Effluent Limitation B.3, pg. 4.)

9. The General Permit prohibits the discharge of non-stormwater, except as allowed in Special Condition D.1 of the General Permit, and requires that such prohibited non-storm water discharges must be eliminated or permitted by a separate NPDES permit. (General Permit, Order Section A.1, pg. 3.)

10. The General Permit requires facility operators to develop a written monitoring program and to conduct quarterly visual observations of non-storm water discharges, monthly visual observations of storm water events, and prescribed storm water sampling and analysis. (General

Permit, Section B.1, 3, 4, and 5, pgs. 24-27.) In addition, facility operators must submit an annual report to the Regional Board that summarizes visual observations and sampling and provides a comprehensive site compliance evaluation. (General Permit, Section B.14, pg. 35.)

11. The General Permit requires that samples be analyzed for toxic chemicals and other pollutants that are likely to be present in storm water discharges in significant quantities. (General Permit, Section B.5.c.ii, pg. 27.)

12. Sims Group USA Corporation, dba Sims Metal Management (Sims or Respondent), is a for-profit Australian corporation registered by the State of Delaware as a corporation and is thus a "person" under Section 502(5) of the Act, 33 U.S.C. § 1362(5). Respondent operates a facility located on property it leases from the Port of Redwood City at 699 Seaport Boulevard, Redwood City, California (Facility). At the Facility, Respondent engages in metal recycling, sorting, shredding, stockpiling, and shipping and receiving activities (including loading and unloading activity at the Facility's rail spur, and operation of a ship-loading conveyor at Wharf 3), activities classified under SIC Major Group 50 as scrap metal and recycling, and is thus subject to the requirements of 40 C.F.R. § 122.26(b)(14)(xi) and the General Permit. (General Permit, Attachment 1, ¶ 6 ("Facilities covered by this general permit")) (Id.)

13. Respondent filed a Notice of Intent with the State Water Resources Control Board to comply with the terms of the General Permit on April 7, 1992. The Respondent's WDID identification number is 2 41I005107.

14. Stormwater and non-stormwater discharge from the Facility to Redwood Creek through the City of Redwood City's municipal separate storm sewer system (City MS4), and from Respondent's operation of the ship-loading conveyor that extends over Redwood Creek at Wharf 3.

15. The City MS4 and Respondent's ship-loading conveyor and associated industrial equipment (e.g., catchment platform and conveyer belt tensioning system) are "point sources" as defined by Section 502(14) of the Act, 33 U.S.C. § 1362(14).

16. Redwood Creek is a tributary to the lower San Francisco Bay which is listed under Section 303(d) of the Act, 33 U.S.C. § 1313(d), as an impaired water body for chlordane, DDT (Dichlorodiphenyltrichloroethane), dieldrin, dioxin compounds (including 2,3,7,8-TCDD), furan compounds, invasive species, mercury, PCBs (polychlorinated biphenyls), dioxin-like PCBs, and trash.

17. Redwood Creek flows within a channel into the San Francisco Bay. Between Bair Island and the Port of Redwood City, Redwood Creek widens to a navigable bay channel containing a mix of fresh water flowing from the creek and the salt water of San Francisco Bay. Redwood Creek is thus subject to the ebb and flow of the tides, and a tributary to the San Francisco Bay, and is therefore a "navigable water" within the meaning of Section 502(7) of the Act, 33 U.S.C. § 1362(7), and a "water of the United States," as defined by EPA regulations at 40 C.F.R. § 122.2.

18. The National Weather Service's Redwood City station (No. 047339), located approximately 2.75 miles from the Facility, recorded at least 124 24-hour rain events resulting in an excess of 0.1 inches of rainfall at the Facility from November 1, 2006 through December 31, 2010 (28 of the 124 rain events exceeded 0.5 inches of rainfall). Rainfall events that exceed 0.1 inches are generally considered the minimum to generate storm water runoff at industrial facilities. See 55 Fed. Reg. 47990, 48018 ("National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges" (Final Rule)).

19. On March 4, 2011, EPA inspected the Facility to evaluate Respondent's compliance with the General Permit. The inspection report is attached for reference (**Attachment 1**). EPA also subsequently reviewed the Respondent's SWPPP that was made available to EPA during the inspection.

a. Based on the March 4, 2011 inspection and the review of the SWPPP, EPA noted that the SWPPP did not adequately:

i. identify all the Facility's discharge points on the site map, for example, all Redwood City MS4 drain inlets at the Facility, any discharge points at the ship-loading conveyer and associated industrial equipment at Wharf 3; and any discharge points at the rail spur (General Permit, Section A.4.b, pg. 14);

ii. identify all locations on the site map where materials are directly exposed to precipitation, for example, debris and automobile shredder residue (ASR) located below and adjacent to the ship-loading conveyer and associated industrial equipment, and at the rail spur (General Permit, Section A.4.d, pg. 14);

iii. identify all areas of industrial activity on the site map, notably operation and maintenance of the ship-loading conveyor and its associated structures and industrial processes, and the handling of materials delivered by rail (General Permit, Section A.4.e, pg. 14);

iv. describe the Facility's industrial activities, for example, the SWPPP does not contain a description of the activities associated with the ship-loading conveyer and its associated industrial equipment, and the rail spur (General Permit, Section A.6. pp. 14-16);

v. assess all industrial activities and potential pollutant sources at the Facility, for example, the ship-loading conveyer and associated industrial equipment, and the rail spur (General Permit, Section A.7, pp. 16-17); and

vi. describe the storm water BMPs to be implemented at the Facility for each potential pollutant and its source, for example, the ship-loading conveyer and its associated industrial equipment, and the rail spur (General Permit, Section A.8, pg. 17).

b. Based on the March 4, 2011 inspection and the review of the SWPPP, EPA noted that

Respondent had not adequately implemented BMPs at the Facility to reduce or prevent pollutants in storm water discharges as required by General Permit Effluent Limitation B.3 and Section A.8, in that:

i. ASR was evident outdoors throughout the ship-loading conveyer area, and on its associated industrial equipment, that would discharge into Redwood Creek as a result of rainfall (*see, e.g.,* Inspection Report photos IMGP0252-272); and

ii. poor housekeeping practices, including inadequate track out controls, were observed throughout the Facility. For example, sediment was observed at the Facility on roads where it was subject to track-out to areas where the pollutants could become entrained in storm water discharges (*see, e.g.,* Inspection Report photos IMGP0200, 0203, 0216, 0250, 0259, and 0302).

c. Based on the March 4, 2011 inspection, EPA observed evidence, *e.g.*, ASR perched on over-water conveyor footings and Wharf 3 areas as depicted in Inspection Report photos IMGP0261, 0263, 0265, and 0266, that Respondent's operation of the ship-loading conveyor was likely discharging pollutants directly to Redwood Creek.

d. Based on review of the SWPPP, monitoring reports, and the annual reports during the March 4, 2011 inspection, EPA noted that Respondent's monitoring and storm water sampling plan did not identify any storm water sampling points, did not identify the pollutant sources and areas of pollutant generating activities associated with the ship-loading conveyor area and its associated equipment, or the rail spur, and also did not demonstrate monitoring at the ship-loading conveyor area or rail spur.

20. On August 25, 2011, EPA inspected the public areas outside Respondent's leased boundaries to further evaluate Respondent's compliance with the General Permit, and also to conduct soil and ASR sampling along Redwood Creek's shoreline and from the City's MS4 structures adjacent to the Facility. The inspection report is attached for reference (**Attachment 2**). Based on the August 25, 2011 inspection, EPA observed:

a. ASR falling from the ship-loading conveyor that extends across Herkner Drive and then across the open water of Redwood Creek during Respondent's ship-loading operations. EPA observed the ASR falling onto a segment of Herkner Drive located upgradient of storm drains into which storm water would flow during a rain event.

b. ASR along the shoreline to the south of the ship-loading conveyor footing, in the area photographed during the March 4, 2011 inspection (*see, e.g.,* Inspection Report photos IMPG0714-722), and ASR located along the shoreline to the north of the ship-loading conveyor footing (*see, e.g.,* Inspection Report photo IMGP0725);

c. debris along the rail spur associated with the unloading of shredded or partially shredded material including foam, rubber tubing and gaskets, insulated copper wire, nuts, bolts, metal pieces and shards, fibrous material, and broken plastic; and

d. non-storm water discharges from a water truck flowing into the City MS4 system along Herkner Drive (*see, e.g.*, Inspection Report photos IMGP0727, 0730, 0738, 0739, 0742, and 0744-0748).

21. The Analytical Testing Results of samples collected during the August 25, 2011 inspection show significant levels of metals (e.g., lead), polycyclic aromatic hydrocarbons (PAHs), and PCBs, in the debris located next to the ship-loading conveyor and its associated equipment. The Analytical Testing Results are attached for reference (**Attachment 2**).

22. EPA finds storm water discharged from the Facility is storm water discharge associated with industrial activity as defined by EPA regulations in 40 CFR § 122.26(b)(14), and contains "pollutants," including metals, PAHs, and PCBs, as defined by Section 502(6) of the Act, 33 U.S.C. § 1362(6).

23. EPA finds that the debris and ASR that discharges directly from the Facility's ship-loading conveyor and associated equipment contains "pollutants," as defined by Section 502(6) of the Act, 33 U.S.C. § 1362(6).

24. Based on the foregoing, EPA finds Respondent has violated the Act as follows:

a. Respondent violated Section 301(a) of the Act, 33 U.S.C. § 1311(a), by discharging pollutants directly from the Facility's ship-loading conveyor and associated equipment to waters of the United States without appropriate permit coverage.

b. Respondent violated Section 301(a) of the Act, 33 U.S.C. § 1311(a), by discharging non-stormwater during Respondent's operation of the Facility's water trucks in violation of the General Permit's discharge prohibitions for non-storm water, General Permit, Order Section A.1, pg. 3.

c. Respondent violated Section 301(a) of the Act, 33 U.S.C. § 1311(a), by discharging pollutants in storm water during rain events into waters of the United States while failing to comply with the General Permit by:

i. failing to adequately identify all industrial activities and pollutant sources at the Facility, e.g., the Facility's ship-loading conveyor, its associated equipment, and the rail spur, in the SWPPP site map in accordance with General Permit Section A.4, pgs. 12-14.

ii. failing to adequately describe and assess in the SWPPP all industrial activities at the Facility, e.g., operation of the Facility's ship-loading conveyor, its associated equipment, and activities at the rail spur, in accordance with General Permit Sections A.6 and A.7, pp. 14-17;

iii. failing to adequately describe and implement BMPs such as track out controls as

required by General Permit Effluent Limitation B.3, pg. 4, and Section A.8, pg. 17; and

iv. failing to fully implement the monitoring program including quarterly visual observations of non-storm water discharges, monthly visual observations of storm water events, and storm water sampling at the Facility's ship-loading conveyor, its associated equipment, and rail spur in accordance with General Permit Sections B.1, 3, 4, and 5, pgs. 24-27.

ORDER FOR COMPLIANCE

Considering the foregoing Findings of Violations and the potential environmental and human health effects of the violations, EPA has determined that compliance in accordance with the following requirements is reasonable. Pursuant to its authorities under Sections 308 and 309 of the Act, 33 U.S.C. §§ 1318 and 1319, EPA hereby orders Respondent to comply with the following requirements:

25. Immediately upon receipt of this Order, Respondent must take all necessary measures to fully and properly comply with all terms and conditions of the General Permit.

26. Within 30 days of the receipt of this Order, Respondent must submit a revised SWPPP to EPA that fully complies with the General Permit, which reflects the results of the recent sampling data, and which addresses the observations made in EPA's March 4, 2011 and August 25, 2011 inspection reports. The revised SWPPP must include, among all other required elements:

a. an updated site map that complies with General Permit Section A.4, and which identifies:

i. all structures or areas associated with industrial activities performed by Respondent at its Facility, including the ship-loading conveyor at Wharf 3, and all other shipping and receiving activities (e.g., industrial activities at the rail spur);

ii. all MS4 catch basins that may receive storm water and non-storm water discharges from Respondent's industrial activities at its Facility; and

iii. all storm water sampling locations identified in its revised monitoring and sampling plan, including those sampling locations located at the ship-loading conveyor area and rail spur;

b. a narrative description and assessment of all industrial activities performed by Respondent at its Facility, including:

i. operation and maintenance of the ship-loading conveyor and any other shipping or material handling activities performed by Respondent at its Facility, such as the unloading of rail cars (e.g., operation of the magnetic boom at the rail spur along Herkner Drive) and transport of processed or partially processed material;

ii. the use of water trucks for dust control and cleaning, including their water source, the volume of water used, and the location and frequency of their use at the Facility; and

iii. any non-storm water discharges, including the sources of those discharges and the discharge points, including non-stormwater discharges associated with water truck spraying;

c. an identification of all potential points of discharge of pollutants from the ship-loading conveyor and its associated equipment (e.g., the underlying catchment platform);

d. a narrative description of the storm water BMPs to be implemented at the Facility for each potential pollutant and its source identified in the site assessment required by the General Permit (Sections A.6 and A.7), including appropriate BMPs to address:

i. housekeeping practices observed during the March 4, 2011 inspection related to sweeping and dust and track-out controls;

ii. equipment washing/rinsing/decontamination;

iii. storm drain inlet protection;

iv. storm water pollution prevention along the shoreline to the south of the ship-loading conveyor footing, in the area photographed during EPA's March 4, 2011 inspection (*see, e.g.,* March 4, 2011 Inspection Report Photos IMPG0261 through IMPG02610268), and photographed during EPA's August 25, 2011 inspection (*see, e.g.,* August 25, 2011 Inspection Report Photos IMGP0718 through IMGP0725), and to the north of the ship-loading conveyor footing (*see, e.g.,* March 4, 2011 Inspection Report Photo IMPG0269; and August 25, 2011 Inspection Report Photo IMGP0725); and

e. a revised monitoring and storm water sampling plan that includes all facility pollutant sources and areas of pollutant generating activities, all storm water sampling points at the Facility, including those identified at the ship-loading conveyor area, and procedures Respondent will follow to assess conditions at the site to determine if a discharge will occur during or following a storm event.

27. After Respondent's submittal of its revised SWPPP pursuant to paragraph 26 above, Respondent shall sample storm water at the Facility during the next 24-hour storm event of 0.1-inch or greater at the sampling points identified in the revised monitoring and storm water sampling plan required pursuant to paragraph 26.e above, using the following specified sampling methods provided at 40 C.F.R. Part 136 for the following pollutants:

a. total suspended solids (TSS), using sampling method CWA 160.2 (or most current) or 2540D from Standard Methods 18th, 19th or 20th edition;

b. metals (not including mercury) using sampling method CWA 200.7 or 200.8 (or most current);

c. mercury, using sampling method CWA 245.7 (or 1631E);

d. chemical oxygen demand (COD), using sampling method CWA 410.3 or 410.4;

e. polycyclic aromatic hydrocarbons (PAHs), using sampling method CWA 625, 1625B or RCRA 8270 D (or most current); and

f. polychlorinated biphynels (PCBs), using sampling method CWA 625 or SW-846 Method 8082A (PCB Aroclors) or latest revision and CWA Method 1668C (as the sufficiently sensitive method) for PCB congeners.

28. Respondent must continue to sample storm water discharges from at least one 24-hour rain event resulting in 0.1 inches or more of rainfall in accordance with paragraph 27 in each of the months of January, February, March, April, and May 2012. Respondent will report the analytical results of this monthly sampling to EPA at the address provided below in paragraph 34 no later than 30 days from the date sampling occurs or no later than 10 days after receiving the analytical results from Respondent's laboratory, whichever is earliest.

29. Within 30 days of receiving this Order, Respondent must provide to EPA the following information:

a. the lease and other relevant documents regarding Respondent's property interest in the Facility's site; and

b. any plan or Standard Operating Procedure that Respondent uses to segregate wastes delivered to the Facility prior to shredding.

30. Within 90 days of receipt of this Order, Respondent must submit to EPA a written plan (the "Compliance Plan"), including a schedule that describes the steps Respondent will take to address the following compliance items within twelve months of the effective date of this Order:

a. eliminate or otherwise address (e.g., obtain permit authorization for) any unauthorized non-storm water discharges of pollutants from any industrial activities performed by Respondent at its Facility including operation and maintenance of the ship-loading conveyor and its associated structures, to Redwood Creek; and

b. prevent or reduce the discharge of pollutants in storm water associated with industrial activity performed by Respondent at its Facility to Redwood Creek made through the City MS4, including the storm drains located near or adjacent to:

i. the ship-loading conveyor;

ii. the rail spur along Herkner Drive; and

iii. the drainage ditch located alongside Seaport Boulevard located on the eastern side of Respondent's property line at the Port.

31. Within 90 days of the receipt of this Order, Respondent must also submit a report to EPA providing:

a. a detailed accounting of the costs associated with development of the revised SWPPP;

b. an accounting of the projected incremental annual costs associated with implementation of the revised SWPPP;

c. an accounting of any other costs associated with complying with this Order, including:

i. the costs of addressing the direct discharge of pollutants from the ship-loading conveyor and its associated industrial activities to Redwood Creek, and the costs of addressing the non-storm water discharges to Redwood Creek made through the City MS4;

ii. the costs of storm water sampling required under paragraph 27, including the costs of sampling for PCBs; and

d. photographic evidence of Respondent's efforts to date to eliminate the direct discharge of pollutants associated with the ship-loading conveyor and its associated equipment to Redwood Creek; to eliminate any non-storm water discharges to Redwood Creek made through the City MS4, including discharges to storm drains located directly adjacent to the ship-loading conveyor and rail spur; and to install adequate BMPs at the rail spur.

32. Respondent must ensure that performance of the measures necessary to comply with this Order not cause or contribute any runoff to waters of the United States, including through the City MS4. Care must also be taken to ensure compliance with all applicable federal, state, and local waste storage and disposal requirements.

33. All reports submitted pursuant to this Order must be signed by a principal executive officer, ranking elected official, or duly authorized representative of Respondent (as specified by 40 C.F.R. § 122.22(b)(2)) and must include the following statement:

> *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there*

are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

34. All submissions requested by this Order must be mailed to the following address:

U. S. Environmental Protection Agency - Region 9
Clean Water Act Compliance Office
75 Hawthorne Street (mail code: WTR-7)
San Francisco, CA 94105
Attention: Luis Garcia-Bakarich

All telephone inquiries should be made to Luis Garcia-Bakarich, Life Scientist, at (415) 972-3496.

35. Respondent must send a copy of all submissions required under this Order to:

California Regional Water Quality Control Board –San Francisco Bay Region
1515 Clay Street
Oakland, CA 94612
Attention: Shin-Roei Lee

36. This Order is binding upon Respondent and its officers, directors, agents, employees, heirs, successors, and assigns.

37. This Order is not a permit under the Act, and does not waive or modify Respondent's obligation and responsibility to ascertain and comply with all applicable federal, state, or local laws, regulations, ordinances, permits, or licenses.

38. This Order is not to be deemed an election by EPA to forgo any remedies available to it under the law, including without limitation, any administrative, civil, or criminal action to seek penalties, fines, or other appropriate relief under the Act. EPA reserves all rights and remedies, legal and equitable, available to enforce any violations cited in this Order and to enforce this Order.

39. Requests for information contained within this Order are not subject to review by the Office of Management and Budget under the Paperwork Reduction Act because it is not a "collection of information" within the meaning of 44 U.S.C. § 3502(3). It is directed to fewer than ten persons and is an exempt investigation under 44 U.S.C. § 3518(c)(1) and 5 C.F.R. § 1320.4(a)(2).

40. Respondent may not withhold from EPA any information on the grounds that it is confidential business information. However, EPA has promulgated, under 40 C.F.R. Part 2, Subpart B, regulations to protect confidential business information it receives. A claim of business confidentiality may be asserted in the manner specified by 40 C.F.R. § 2.203(b) for all or part of the information requested by EPA. EPA will disclose business information covered by such claim only as authorized under 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality

accompanies the information at the time EPA receives it, EPA may make it available to the public without further notice.

41. Sections 309(a), (b), (d) and (g) of the Act, 33 U.S.C. §§ 1319(a), (b), (d) and (g), provide administrative and/or judicial relief for failure to comply with the Act. In addition, Section 309(c) of the Act, 33 U.S.C. § 1319(c), provides criminal sanctions for negligent or knowing violations of the Act and for knowingly making false statements.

42. This Order is effective on the date it is received by Respondent.

Alexis Strauss, Director
Water Division

16 December 2011
Date

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF COMPLIANCE & INSPECTION

IN RE: SMM New England Corporation **FILE NO.: WP 12-5**
X-ref. WP11-089

NOTICE OF VIOLATION

A. Introduction

Pursuant to Sections 42-17.1-2(21) and 42-17.6-3 of the Rhode Island General Laws, as amended, ("R.I. Gen. Laws") you are hereby notified that the Director of the Department of Environmental Management (the "Director" of "DEM") has reasonable grounds to believe that the above-named party ("Respondent") has violated certain statutes and/or administrative regulations under DEM's jurisdiction.

B. Administrative History

On October 25, 2011 the DEM met with SMM New England Corporation ("SMM") and its consultants. SMM informed the DEM that at present it wanted to continue with the ship building/repair business previously done by Promet Marine Services Corporation ("Promet"). The DEM informed SMM that it needed to file a request to transfer the stormwater permit that DEM issued to Promet to SMM. The DEM advised SMM that if/when it decides to expand the activities beyond ship building/repair it would need to reapply for authorization and submit a new stormwater pollution prevention plan that addressed the proposed activities. SMM did not file a request to transfer the stormwater permit that DEM issued to Promet until January 12, 2012 and expanded its activities to scrap metal recycling without reapplying to the DEM for authorization to do so. On January 24, 2012 the DEM met with SMM. SMM agreed to install a concrete wall around the scrap metal recycling area. On February 15, 2012 the DEM inspected the property and determined that SMM had constructed the concrete wall and that stormwater runoff from the scrap metal recycling area would not enter the Providence River.

C. Facts

(1) The subject property is located at 242 Allens Avenue, Assessor's Plat 46, Lot 326 in the city of Providence, Rhode Island (the "Property").

(2) The Property currently includes a business engaged in ship repair/maintenance and scrap metal recycling (the "Facility").

(3) SMM New England Corporation ("SMM") owns the Property and operates the Facility. SMM acquired the Property from Promet Marine Services Corporation ("Promet") and began operating the Facility on October 7, 2011.

(4) On April 17, 2006 Promet obtained coverage under the Rhode Island Pollutant Discharge Elimination System Multi-Sector General Permit (the "MSGP") to discharge stormwater to the Providence River associated with industrial activity at the Property. The MSGP required Promet to comply with its Stormwater Pollution Prevention Plan ("SWPPP"). The SWPPP described ship repair/maintenance only.

(5) The DEM's Regulations for the Rhode Island Pollutant Discharge Elimination System ("RIPDES") require the submission of a written request to the DEM to automatically transfer a permit to a new permittee for the permit to remain in effect.

(6) On December 20, 2011 the DEM Office of Compliance and Inspection ("OC&I") inspected the Property. The inspection revealed a discharge of stormwater associated with industrial activity (in the form of scrap metal recycling and ship repair/maintenance) to the Providence River.

(7) On January 12, 2012, SMM submitted to the DEM Office of Water Resources ("OWR") a letter requesting the transfer of the MSGP from Promet to SMM (the "Transfer Request").

(8) The Transfer Request was signed by Anthony Izzo, CMM's Region President, who certified that he had read the MSGP and agreed to abide by all of the conditions of the MSGP and that the production levels, products produced, rates of discharge, and wastewater characteristics remain unchanged.

(9) As of the date of this Notice of Violation ("NOV"), the Respondent has not obtained approval from the OWR to discharge stormwater associated with industrial activity to the Providence River from the Property.

D. Violation

Based on the foregoing facts, the Director has reasonable grounds to believe that you have violated the following statutes and/or regulations:

(1) **Rhode Island's Water Pollution Act, Section 46-12-5(b)** – requiring the discharge of any pollutant into waters of the State comply with the terms and conditions of a permit and applicable regulations.

(2) **DEM's Water Quality Regulations, Rule 13(A)** – prohibiting the discharge of any pollutant into or conducting any activity which will likely cause or contribute pollution to the waters of the State without having obtained all required approvals from the DEM.

(3) **DEM's RIPDES Regulations**

(a) **Rule 12(d)** – requiring the permittee to submit accurate information on an application to the DEM.

(b) **Rule 31(a)(1)(i)** – requiring a permit for a stormwater discharge associated with industrial activity.

E. Order

Based upon the violations alleged above and pursuant to R.I. Gen. Laws Section 42-17.1-2(21), you are hereby ORDERED to:

(1) **IMMEDIATELY** cease receiving any scrap metal. No scrap metal shall be received until SMM obtains a stormwater permit from the DEM and constructs the stormwater controls required pursuant to the permit.

(2) **IMMEDIATELY** cease receiving any ships for repair/maintenance. No ships shall be received until SMM obtains a stormwater permit from the DEM.

(3) **Within sixty (60) days of receipt of the NOV,** remove all scrap metal from the Property.

(4) **Within sixty (60) days of receipt of the NOV,** complete repairs/maintenance to all ships on the Property.

(5) **Within seven (7) days of completing ordered actions E(3) and E(4) above,** clean and sweep the Property of any waste debris associated with ship repair/maintenance and properly dispose of the waste in accordance with all applicable laws and regulations.

F. Penalty

(1) Pursuant to R.I. Gen. Laws Section 42-17.6-2, the following administrative penalty, as more specifically described in the attached penalty summary and worksheets, is hereby ASSESSED, jointly and severally, against each named respondent:

Twenty Five Thousand Dollars ($25,000.00)

(2) The proposed administrative penalty is calculated pursuant to the DEM Rules and Regulations for Assessment of Administrative Penalties, as amended, and must be paid to the DEM within 20 days of your receipt of the NOV. Payment shall be in the form of a certified check, cashiers check, or money order made payable to the "General Treasury - Water & Air Protection Program Account" and shall be forwarded to the DEM Office of Compliance and Inspection, 235 Promenade Street, Suite 220, Providence, Rhode Island 02908-5767.

(3) Penalties assessed against the Respondent in this NOV are penalties payable to and for the benefit of the State of Rhode Island and are not compensation for actual pecuniary loss.

(4) If any violation alleged herein shall continue, then each day during which the violation occurs or continues shall constitute a separate offense and the penalties and/or costs for that violation shall continue to accrue in the manner set forth in the attached penalty summary and worksheets. The accrual of additional penalties and costs shall be suspended if the DEM determines that reasonable efforts have been made to comply promptly with this NOV.

G. Right to Administrative Hearing

(1) Pursuant to R.I. Gen. Laws Chapters 42-17.1, 42-17.6, 42-17.7 and 42-35, each named respondent is entitled to request a hearing before the DEM Administrative Adjudication Division regarding the allegations, orders and/or penalties set forth in Sections B through F above. All requests for hearing MUST:

(a) Be in writing. See R.I. Gen. Laws Sections 42-17.1-2(21)(i) and 42-17.6-4(b);

(b) Be **RECEIVED** by DEM's Administrative Adjudication Division, at the following address, within twenty (20) days of your receipt of this NOV. See R.I. Gen. Laws Sections 42-17.1-2(21)(i) and 42-17.7-9:

Administrative Clerk
Office of Administrative Adjudication
One Capitol Hill, 2ND Floor
Providence, RI 02903

(c) Indicate whether you deny the alleged violations and/or whether you believe that the administrative penalty is excessive. See R.I. Gen. Laws Section 42-17.6-4(b); **AND**

(d) State clearly and concisely the specific issues which are in dispute, the facts in support thereof and the relief sought or involved, if any. See Rule 7.00(b) of the DEM Administrative Rules of Practice and Procedure for the Administrative Adjudication Division of Environmental Matters.

(2) A copy of each request for hearing must also be forwarded to:

Susan Forcier, Esquire
DEM - Office of Legal Services
235 Promenade Street, 4TH Floor
Providence, RI 02908-5767

(3) Each named respondent has the right to be represented by legal counsel at all administrative proceedings relating to this matter.

(4) Each respondent must file a separate and timely request for an administrative hearing before DEM's Administrative Adjudication Division as to each violation alleged in the written NOV. If any respondent fails to request a hearing in the above-described time or manner with regard to any violation set forth herein, then this NOV shall automatically become a Final Compliance Order enforceable in Superior Court as to that respondent and/or violation and any associated administrative penalty proposed in the NOV shall be final as to that respondent. See R.I. Gen. Laws Sections 42-17.1-2(21)(i) and (v) and 42-17.6-4(b) and (c).

(5) Failure to comply with this NOV may subject each respondent to additional civil and/or criminal penalties.

(6) An original signed copy of this NOV is being forwarded to the city of Providence wherein the Property is located to be recorded in the Office of Land Evidence Records pursuant to R.I. Gen. Laws Chapter 34-13 and Section 46-12-9(c).

(7) This NOV does not preclude the Director from taking any additional enforcement action nor does it preclude any other local, state, or federal governmental entities from initiating enforcement actions based on the acts or omissions described herein.

If you have any legal questions, you may contact (or if you are represented by an attorney, please have your attorney contact) Susan Forcier at the DEM Office of Legal Services at (401) 222-6607. All other inquiries should be directed to me at (401) 222-1360 ext. 7400.

Please be advised that any such inquiries do not postpone, eliminate, or otherwise extend the need for a timely submittal of a written request for a hearing, as described in Section G above.

FOR THE DIRECTOR

David E. Chopy, Chief
DEM Office of Compliance and Inspection

Date: May 8, 2012

CERTIFICATION

I hereby certify that on the 8th day of May 2012 the within Notice of Violation was forwarded to:

SMM New England Corporation
c/o Corporation Service Company, Registered Agent
222 Jefferson Boulevard, Suite 200
Warwick, RI 02888

by Certified Mail.

Lynne DeBritto

ADMINISTRATIVE PENALTY SUMMARY

Program: *OFFICE OF COMPLIANCE AND INSPECTION, Water Pollution*
File No.: *WP 12-5, X-ref WP11-089*
Respondent: *SMM New England Corporation*

GRAVITY OF VIOLATION

SEE ATTACHED "PENALTY MATRIX WORKSHEETS."

VIOLATION No. & CITATION	APPLICATION OF MATRIX		PENALTY CALCULATION		AMOUNT
	Type	Deviation	Penalty from Matrix	Number or Duration of Violations	
D(1), D(2) and D(3)(b) – Discharge of stormwater associated with industrial activity without a permit	Type I *($25,000 Max. Penalty)**	Major	$12,500	1 violation	$12,500
D(3)(a) – Failure to submit accurate information on an application	Type I *($25,000 Max. Penalty)**	Major	$12,500	1 violation	$12,500
				SUB-TOTAL	***$25,000.00***

Maximum Penalties represent the maximum penalty amounts per day, per violation.

TOTAL PENALTY PROPOSED UNDER PENALTY REGULATIONS = $25,000.00

PENALTY MATRIX WORKSHEET

CITATION: Discharge of stormwater associated with industrial activity without a permit
VIOLATION NO.: D(1), D(2) and D(3)(b)

TYPE		
X TYPE I DIRECTLY related to protecting health, safety, welfare or environment.	***___ TYPE II*** INDIRECTLY related to protecting health, safety, welfare or environment.	***___ TYPE III*** INCIDENTAL to protecting health, safety, welfare or environment.

DEVIATION FROM THE STANDARD

THE DEGREE TO WHICH A PARTICULAR VIOLATION IS OUT OF COMPLIANCE WITH THE REQUIREMENT VIOLATED.

FACTORS CONSIDERED:

Taken from Section 10(a)(2) of the DEM *Rules and Regulations for Assessment of Administrative Penalties*

(A) ***The extent to which the act or failure to act was out of compliance:*** The Respondent discharged storm water associated with industrial activity without a permit from the DEM.

(B) ***Environmental conditions:*** The property is located directly adjacent to the Providence River. The Providence River is a class SB1{a} water of the State, which waters are designated for primary and secondary contact recreational activities and for fish and wildlife habitat. However, primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. These waters shall have good aesthetic value. The Providence River in the area of the property is impacted by sewage overflows after heavy rainstorms, which results in the discharge of tens of millions of gallons of untreated wastewater and stormwater into the river.

(C) ***Amount of the pollutant:*** Unknown – depends on the pollutants deposited on the land and the intensity and duration of rain storms.

(D) ***Toxicity or nature of the pollutant:*** The SWPPP issued to Promet included the following pollutants of concern associated with ship repair/maintenance: dirt, paint solids, metals, suspended solids, sandblast grit, mineral spirits/solvents, diesel fuel, waste oil, and gasoline. The scrap metal recycling operation is likely to have many of the same pollutants of concern.

(E) ***Duration of the violation:*** 5 months. On October 7, 2011 SMM acquired the property and engaged in industrial activity that required a stormwater permit. Thus far, no permit has been issued to SMM by DEM for any industrial activity on the property.

(F) ***Areal extent of the violation:*** Not utilized for this calculation.

(continued)

(continued from the previous page)

(G) ***Whether the person took reasonable and appropriate steps to prevent and/or mitigate the noncompliance:*** The Respondent did not take reasonable action to prevent the violation. On October 25, 2011 the DEM met with SMM and its consultants. SMM informed the DEM that at present it wanted to continue with the ship building/repair business previously done by Promet. The DEM informed SMM that it needed to file a request to transfer the stormwater permit that DEM issued to Promet to SMM. The DEM advised SMM that if/when it decides to expand the activities beyond ship building/repair it would need to reapply for authorization and submit a new stormwater pollution prevention plan that addressed the proposed activities. SMM expanded its activities to scrap metal recycling without reapplying to the DEM for authorization to do so. On January 24, 2012 the DEM met with SMM. SMM agreed to install a concrete wall around the scrap metal recycling area. On February 15, 2012 the DEM inspected the property and determined that SMM had constructed the concrete wall and that stormwater runoff from the scrap metal recycling area would not enter the Providence River.

(H) ***Whether the person has previously failed to comply with any regulations, order, statute, license, permit or approval issued or adopted by the Department, or any law which the Department has the authority or responsibility to enforce:*** Not utilized for this calculation.

(I) ***The degree of willfulness or negligence, including but not limited to, how much control the violator had over the occurrence of the violation and whether the violation was foreseeable:*** The Respondent had knowledge of the required permit and has complete control over the operations occurring at the property. The Respondent continues to operate and expanded the activities at the property without a permit for financial gain.

(J) ***Any other factor(s) that may be relevant in determining the amount of a penalty:*** Not utilized for this calculation.

X MAJOR	***MODERATE***	***MINOR***

Penalty Matrix where the applicable statute provides for a civil penalty up to $25,000		***TYPE I***	TYPE II	TYPE III
DEVIATION FROM STANDARD	***MAJOR***	$12,500 to $25,000 ***$12,500***	$6,250 to $12,500	$2,500 to $6,250
	MODERATE	$6,250 to $12,500	$2,500 to $6,250	$1,250 to $2,500
	MINOR	$2,500 to $6,250	$1,250 to $2,500	$250 to $1,250

PENALTY MATRIX WORKSHEET

CITATION: Failure to submit accurate information on an application
VIOLATION NO.: D(3)(a)

TYPE		
X ***TYPE I*** DIRECTLY related to protecting health, safety, welfare or environment.	___ ***TYPE II*** INDIRECTLY related to protecting health, safety, welfare or environment.	___ ***TYPE III*** INCIDENTAL to protecting health, safety, welfare or environment.

DEVIATION FROM THE STANDARD

THE DEGREE TO WHICH A PARTICULAR VIOLATION IS OUT OF COMPLIANCE WITH THE REQUIREMENT VIOLATED.

FACTORS CONSIDERED:

Taken from Section 10(a)(2) of the DEM *Rules and Regulations for Assessment of Administrative Penalties*

(A) ***The extent to which the act or failure to act was out of compliance:*** The Respondent failed to submit accurate information on a permit transfer request to DEM. Submission of accurate information on a permit transfer request is of major importance to the DEM.

(B) ***Environmental conditions:*** Not utilized for this calculation.

(C) ***Amount of the pollutant:*** Not utilized for this calculation.

(D) ***Toxicity or nature of the pollutant:*** Not utilized for this calculation.

(E) ***Duration of the violation:*** Not utilized for this calculation.

(F) ***Areal extent of the violation:*** Not utilized for this calculation.

(continued)

(continued from the previous page)

(G) ***Whether the person took reasonable and appropriate steps to prevent and/or mitigate the noncompliance:*** The Respondent did not take reasonable action to prevent the violation. The permit transfer request submitted on January 12, 2012 certified that Respondent would engage in the same activities as Promet and that the production levels, products produced, rates of discharge, and wastewater characteristics remained unchanged. DEM inspections on December 20, 2011 and February 15, 2012 revealed that the Respondent was engaged in scrap metal recycling, which is an activity that has not been approved by RIDEM, and is not what Promet was engaged in. The Respondent took action to mitigate the violation by submitting a revised permit application to DEM in March 2012 for this activity.

(H) ***Whether the person has previously failed to comply with any regulations, order, statute, license, permit or approval issued or adopted by the Department, or any law which the Department has the authority or responsibility to enforce:*** Not utilized for this calculation.

(I) ***The degree of willfulness or negligence, including but not limited to, how much control the violator had over the occurrence of the violation and whether the violation was foreseeable:*** The violation is knowing and willful. The permit transfer request was signed by Anthony Izzo, the Region President of SMM, who certified that he had read the permit issued to Promet and agreed to abide by all the conditions of the permit and that the production levels, products produced, rates of discharge, and wastewater characteristics remained unchanged.

(J) ***Any other factor(s) that may be relevant in determining the amount of a penalty:*** Not utilized for this calculation.

X MAJOR	***MODERATE***	***MINOR***

Penalty Matrix where the applicable statute provides for a civil penalty up to $25,000		***TYPE I***	TYPE II	TYPE III
DEVIATION FROM STANDARD	***MAJOR***	$12,500 to $25,000 ***$12,500***	$6,250 to $12,500	$2,500 to $6,250
	MODERATE	$6,250 to $12,500	$2,500 to $6,250	$1,250 to $2,500
	MINOR	$2,500 to $6,250	$1,250 to $2,500	$250 to $1,250

C

-----Original Message-----
From: Lutz, Tim
Sent: Thursday, October 04, 2012 9:32 AM
To: 'Mark Blackburn'
Cc: Silva, Frank; Vespia, Richard; Dillon, Michael; O'Toole, Michael; Carvalho, Tony; Lykins, Jeff
Subject: RE: Sims Metal Management - 242 Allens Avenue

Mark,

Sounds good but, as you know (because I forwarded you copies), I approved the scale house and 3rd floor reno of the building. I do not have a plan # to reference for this yard work. Mark, the work completed earlier that you had suggested but was actually never submitted from the applicant as a plan review was completed without an approval letter. To move forward an application needs to be submitted from Sims for the proposed work. I need a drawing of the platforms with details as well as the info you state in item #3. Section III on the new application can read, "Work proposed and the processes performed are consistant with the April 10, 2012 Hughes report and the October 3, 2012 Hughes report". Another submittal will be required when the membrane structures are constructed.

Plans 107 + 108-12 reported $249,000.00 cost for work with fees totaling $1,560.00 which was paid to "Providence City Collector". This ofice requests a cost breakdown should Sims indicate this included the non-approved work completed and the "new" work you propose.

In closing, the request for a license requires resolution. This office does not consider this massive complex as a "junk shop" and does not have the resources to investigate what license is required. The remaining issues which plaque the fire prevention office are what is an acceptable height for this scrap pile? Who or what agency dictates same and polices same? What does the Department of Inspections & Standards have for outstanding deficiencies? The use of this property appears to have changed. Do they have height restrictions, clearances to property lines and exposures? It appears this pile is encroaching on the adjoining west property. The height of this and subsequent piles remains an unanswered condition this office strongly suggests violates the purpose and intent of the RIUFC 4.1.1 Goals ...hazards created by fire, explosion, and other hazardous conditions.

D

NEWS > LOCAL

Redwood City to Regulators: We Are "Very Concerned" After Sims Metal Fires

City officials request meeting with regulators to discuss how to do more to prevent future fires

By Vicky Nguyen, Liz Wagner and Mark Villarreal

After two fires in November and December at Sims Metal Management's auto shredder facility in Redwood City, city leaders are calling on regulators to do more to help protect residents from future incidents. Vicky Nguyen reports in a story that aired Jan. 23, 2014. (Published Thursday, Jan 23, 2014)

Updated at 12:11 PM PST on Friday, Jan 24, 2014

City leaders in Redwood City sent letters to federal, state and county regulators requesting discussions on how to better protect residents following two recent fires at the Sims Metal Management auto shredding facility in Redwood City, the Investigative Unit has learned.

In the letter dated January 16, city manager Robert Bell wrote that "Redwood City is very concerned about what happened and eager to see that steps are taken to ensure our community and the region are protected from any future incidents."

- **RWC Recycling Fire Sparks Concerns**
- **Download the letter (pdf)**

Six fires have broken out at metal recycling facilities in the Bay Area since 2007. Five of them have happened at facilities owned by Sims. Three of the fires have occurred at Sims' Redwood City plant.

A pile of metal debris from a stockpile of "light iron" recyclable metal exploded and sparked a fire on Tuesday at Sims Metal Management in Redwood City - for the second time in a little more than a month - prompting fears about the quality of air spewing from the blaze. Marianne Favro, Jeff Ranieri and Scott Budman report. (Published Tuesday, Dec 17, 2013)

"We're concerned as anyone else about what started these fires and committed to making sure they don't happen again," said Jill Rodby, Sims' spokesperson, during an interview Thursday.

The meeting requested by Redwood City leaders is scheduled for Jan. 29. Meanwhile, the Bay Area Air Quality Management District issued public nuisance violations for the November and December fires but have yet to issue any fines or penalties.

- INVESTIGATIVE | **Regulators Criticized for Sims Fire in Redwood City**

Critics say regulators have not done enough to prevent fires or to address concerns regarding the waste left behind from the metal recycling process.

"It is toxic and hazardous because we have identified lead and other chemicals that are part of that scrap metal process," Southern California community activist Jesse Marquez said.

Toxic Regulators Questioned at Senate Oversight Hearing

Leaders at the Department of Toxic Substances Control answered tough questions from the Senate Environmental Quality Committee about permitting delays and an outdated hazardous waste tracking system. Vicky Nguyen reports in a story that aired January 15, 2013. (Published Wednesday, Jan 15, 2014)

Marquez lives near a metal shredding facility, owned by another company, in Terminal Island.

The Investigative Unit first reported in September that the state's Department of Toxic Substances Control planned to reclassify metal shredder waste as "hazardous" in 2007 because department studies found that the residue contains lead, cadmium and zinc at levels above regulatory thresholds.

- **Metal Plant Fire Impacting Bay Area Air Quality**

Click here to watch the investigation into the DTSC and the metal shredding industry.

During an interview last August, former DTSC director Maureen Gorsen told the Investigative Unit that, after she left the department, the DTSC was pressured by the metal shredding industry and backed off that plan.

"There is no accountability for an end to end process and making decisions and conclusions," Gorsen said.

At a public meeting Thursday night in Oakland, DTSC's hazardous waste chief Rick Brausch said that the department is again studying the issue, which has been

debated for more than 25 years.

When asked why the DTSC has taken so long to make a decision, Brausch said, "That's one of the things our director [Debbie Raphael] was also frustrated with; the idea these issues have been coming up repeatedly."

During an interview last August, former DTSC director Maureen Gorsen told the Investigative Unit that after she left the department, the DTSC was pressured by the metal shredding industry and backed off that plan.

"There is no accountability for an end to end process and making decisions and conclusions," Gorsen said.

If you have a tip for the Investigative Unit email theunit@nbcbayarea.com or call 888-996-TIPS.

Published at 10:59 PM PST on Jan 23, 2014

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Scrapyard Fire at Sims Metal Burns in Hayward

By Staff and Wires

A fire at a metal yard in Hayward is prompting concerns Saturday night not just about air quality but also about where those fires are happening. This is just the latest in a series of fires at facilities owned and run by Sims Metal Management. That company faced scrutiny last year for two large fires at a metal scrapyard in Redwood City. Now, there was another fire at a Sims facility across the bay. NBC Bay Area's Monte Francis reports. (Published Sunday, Jun 8, 2014)

Updated at 3:13 AM PST on Sunday, Jun 8, 2014

A fire burned at a Hayward scrap yard Saturday afternoon, a fire captain said.

The fire was reported at Sims Metal Management at about 1:40 p.m. at 30104 Industrial Parkway SW, fire Capt. Don Nichelson said.

- **Metal Plant Fire Impacting Bay Area Air Quality**

Crews put out the fire Saturday night, and there is just charred metal left behind. Firefighters said the good news is they were able to put out the fire fairly quickly.

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WEATHER FORECAST

San Francisco, CA

Thick smoke billowed into the air Saturday afternoon from the Sims facility, but firefighters had the flames under control within 20 minutes. The fire was out by 3 p.m.

Sims Metal Plant Fire, 2nd in 6 Weeks

A pile of metal debris from a stockpile of recyclable metal exploded and sparked a fire on Tuesday at Sims Metal Management in Redwood City, prompting fears about the quality of air spewing from the blaze. Chase Cain reports. (Published Tuesday, Dec 17, 2013)

The fire is prompting concerns Saturday night not just about air quality, but also about why there have been a series of fires at facilities in the Bay Area owned by the same company. Last year, Sims Metal faced scrutiny for two large fires at a metal scrapyard in Redwood City--they happened within weeks of each other.

Investigators have determined the Dec. 17 fire was arson but still have not made any arrests. A Sims spokeswoman said there was another fire at the Hayward facility that was also deemed arson a few years ago.

- INVESTIGATIVE Regulators Criticized for Sims Fire in Redwood City

"In 2009, we had a fire in Hayward and we actually have videotape of someone throwing something over the fence, but in this case, we have no idea what started it. It's too early," Jill Rodby said.

The fire caused quite a scare for people who live and work nearby.

Metal Plant Fire Impacting Bay Area Air Quality

A pile of metal debris from a stockpile of "light iron" recyclable metal exploded and sparked a fire on Tuesday at Sims Metal Management in Redwood City - for the second time in a little more than a month - prompting fears about the quality of air spewing from the blaze. Marianne Favro, Jeff Ranieri

and Scott Budman report. (Published Tuesday, Dec 17, 2013)

- **More Smart Cars Tipped in Overnight Pranks in San Francisco's Twin Peaks, Cole Valley**

"The smoke was so thick that it scared me," Union City resident Barbara Patterson. "That's why I came home and closed all my doors and windows."

- **Sims Metal, City Leaders Meet to Prevent Future Fires**

People who live east of the facility in Hayward were robo-called Saturday afternoon and warned to shelter-in-place. That shelter-in-place was lifted, and at this point, there were no advisories from the Air District.

The facility was closed at the time of the fire, but there were security guards on site.

Redwood City to Regulators: We Are "Very Concerned" After Sims Metal Fires

After two fires in November and December at Sims Metal Management's auto shredder facility in Redwood City, city leaders are calling on regulators to do more to help protect residents from future incidents. Vicky Nguyen reports in a story that aired Jan. 23, 2014. (Published Thursday, Jan 23, 2014)

Surveillance cameras could provide clues as to what caused the fire.

Published at 3:42 PM PST on Jun 7, 2014

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Sims Metal Management recycling plant faces questions after fire

Updated August 20 2013 6:03 PM

Chopper 12 was overhead a fire at Sims Metal Management recycling plant in Jersey City (8/20/13)

Related media

Chopper 12 over fire at recycling plant in Jersey City

JERSEY CITY - Owners of a recycling plant in Jersey City will face tough questions after a fire ripped through a scrap yard overnight.

The fire broke out at the Sims Metal Management Claremont Terminal on Linden Avenue East at around 10 p.m. yesterday and could be seen for miles, but plant officials are accused of putting off a call to the fire department.

Mayor Steven Fulop says, "This was probably a situation where they tried to deal with it themselves, and it probably got out of hand."

A spokesman for the company says the fire was concentrated in a stockpile in a scrap metal receiving area.

The company said in a statement that workers promptly called 911.

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Fire at recycling plant in Jersey City

and that although employees began to hose down the fire, they never intended to fight it on their own.

Fulop says the city is investigating how the fire got out of hand and expects the company to face fines.

Facility crews worked with firefighters by using cranes to remove material from the stockpile. Firefighters from all over the city were called in to help extinguish the fire.

A fire at the plant in 2010 raised health concerns, and the company was fined by the Department of Environmental Protection.

Fire officials say no one was injured and there's been no threat to the surrounding area.

A Sims Metal Management spokesperson say the company will work with fire officials to determine the cause of the blaze.

RUNNIN' SCARED A VOICE NEWS BLOG

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Jersey City

Scrap Metal Fire Rages Through The Night at Sims Metal Management in Jersey City

By Tessa Stuart Tue., Aug. 20 2013 at 7:10 AM
Categories: Jersey City

1 Comment

WCBS

in a stockpile in the scrap metal receiving area for the shredder at our Claremont Terminal facility."

Firefighters dispatched to the scene continued to fight the fire, which engulfed a giant pile of scrap metal at least four stories high, through the night. They were assisted by plant employees using heavy duty cranes to remove material from the stockpile.

By dawn a thick plume of smoke was visible from miles around and the smell of burning metal had wafted over the water to Brooklyn.

At 8:30am Tuesday, Haggerty said, "The fire is contained, controlled and nearly extinguished." The cause is still unknown.

Sims Metal Management is the same plant where a giant metal and plastic pile fire raged for 12 hours back in 2010. The plant pulverizes more than 4,000 tons of metal a day.

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Large Fire At Jersey City Recycling Plant Under Control

Mayor Calling For Full Investigation Into Blaze

August 20, 2013 6:10 PM

Related Tags: Bob McHugh, Darren Rivers, Fire, James Shea, Jersey City, Sims Metal Management Company, Steve Sandberg, Steven Fulop, Weijia Jiang

JERSEY CITY, N.J. (CBSNewYork) – Officials are investigating what sparked a massive overnight fire at a Jersey City recycling plant.

The blaze broke out around 10 p.m. Monday at Sims Metal Management Company on Linden Avenue. The fire was concentrated in a stockpile of debris in a scrap metal receiving area, officials said.

(http://www.nj.com/)

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Fire extinguished quickly at Sims Metal Management in Jersey City

Print (http://blog.nj.com/hudsoncountynow_impact/print.html?entry=/2013/10/fire_extinguished_quickly_at.html)

(http://connect.nj.com/user/hzucker/index.html) By Harvey Zucker | The Jersey Journal (http://connect.nj.com/user/hzucker/posts.html)
on October 06, 2013 at 9:07 PM, updated October 06, 2013 at 9:34 PM

A small fire broke out tonight at Sims Metal Management at 1 Linden Ave. in Jersey City, the site of a huge fire in August that burned for 12 hours.

This time, the call came in shortly after 8 p.m. and was "extinguished quickly," said Jersey City public safety spokesman Bob McHugh.

There were no reported injuries, he said.

Here are photos from the August fire:

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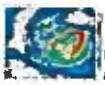
3 tickets split $564M Powerball jackpot, $1M ticket sold in N.J. (http://www.nj.com/lottery/index.ssf/2015/02/3_tickets_to_split_564m_powerball_jackpot_1m_ticke.html#incartread_hudson_article)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Fight over Union strip club continues even as operators beat indictments (http://www.nj.com/union/index.ssf/2015/02/court_throws_out_indictments_against_hott_22_strip.html#incartread_hudson_article)


Gamblers must return $1.5M in casino winnings since cards weren't shuffled, judge rules (http://www.nj.com/business/index.ssf/2015/02/unshuffled_cards_void_game_winnings_must_be_return.html#inread_hudson_article)


$1M Powerball ticket was sold at North Jersey liquor store (http://www.nj.com/lottery/index.ssf/2015/02/1m_powerball_ticket_was_sold_at_north_jersey_liquo.html#incarread_hudson_article)

Video of the Day

1 / 21 Firefighters battled flames that burst out on Linden Avenue in Jersey City August 19, 2013. Joe Shine/For The Jersey

Joe Shine/For The Jersey

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Fishing vessel catches fire at Providence scrap yard

Posted: Jun 23, 2014 12:02 PM EDT
Updated: Jun 23, 2014 3:55 PM EDT

By NBC 10 News

PROVIDENCE - A fire damaged a boat at the Sims Metal Management scrap recycling yard in Providence on Monday.

Firefighters were called to a report of an intense fire on the 70-foot fishing vessel Sea Angel out of New York shortly after 11 a.m.

The boat was at the metal yard for below deck repairs. Providence fire officials told NBC 10 the fire was caused by welding work.

It took firefighters about 40 minutes to get the fire under control. Sims was temporarily closed and no one was allowed into the yard as crews tried to contain the flames.

The fire department said the yard was later reopened Monday afternoon.

The fishing vessel caught fire minutes after firefighters were called to a smaller fire on a larger ship.

The other fire took place on a bulk carrier from Hong Kong called the Jia Hui Shan. Firefighters said the ship's scrap metal cargo caught fire, but the crew was able to extinguish the flames before firefighters arrived.

No injuries were reported in either fire. Both fires were considered accidental.

23 Kenney Drive
Cranston, R.I., 02920

Telephone: 401.455.9100
Fax: 401.455.9140
Email: news@wlar.com

E

Massive fire at metal recycling plant in Johnston

Posted: Dec 22, 2014 8:08 PM EST
Updated: Dec 29, 2014 8:11 AM EST

By Alexandra Cowley CONNECT

By: Alexandra Cowley

acowley@abc6.com

Fire crews from Johnston and Warwick responded to a massive fire at The Sims Metal Recycling plant off Green Earth Avenue in Johnston Monday night around 7 P.M. The smoke could be seen for miles. Johnston's Assistant Fire Chief tells ABC 6 the fire was in a 75 by 75 white metal scrap pile consisting of washers, dryers, and refrigerators. As of 9 P.M., the fire was under control.

We have a crew on scene and will bring you the latest information as it becomes available.

Cause of Scrap Metal Yard Fire Under Investigation

Officials are investigating the cause of a fire at a scrap metal yard in Johnston, Rhode Island

By Tim Jones

Officials are investigating the cause of a fire at a scrap metal yard in Johnston, Rhode Island.

It took a little over two hours to control the fire at Sims Metal Management Monday night.

- **Fire Leaves 2 Homeless**

Special precautions had to be taken because of the metal and plastic that was burning.

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3 People, Dog Die in Crash; 2

No injuries were reported.

- **Man Burned in 2-Alarm Fire**

Published at 6 27 AM EST on Dec 23, 2014

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Firefighters douse flames at Johnston scrap yard

By Shaun Towne

Published: December 22, 2014, 8:01 pm | Updated: December 22, 2014, 11:50 pm

JOHNSTON, R.I. (WPRI) — Firefighters from two departments worked together Monday night to put o

Flames broke out just after 7 p.m. at Sims Metal Management on Green Earth Way, according to city fir

Crews utilized foam to smother the fire, but had to call in Warwick firefighters when more was needed. T
was made up of primarily appliances.

The flames were extinguished by 9:30 p.m.

No hazardous chemicals were present because the appliances were drained before being thrown into the
because of the burning metal and plastic.

No injuries were reported at the scene. The cause of the fire remains under investigation.

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Joshua L. Celeste
jceleste@duffysweeney.com

October 5, 2011

Jeffrey L. Lykins, R.A.,
Acting Director
Providence Department of Inspections and Standards
190 Dyer Street
Providence, RI 02903

Re: SMM New England Corporation Plat 46, Lot 326, Plat 46, Lot 361
Plat 47, Lot 804

Dear Mr. Lykins:

I write on behalf of SMM New England Corporation ("SMM"), a global metals recycling leader which turns unwanted post-consumer items and industrial scrap into raw materials for manufacturing operations around the world. SMM is currently in the process of negotiating to acquire the facility (including the docks and marine access) located at 242 Allens Avenue, Providence, Rhode Island, 02905 (the "Site"). If acquired, SMM will continue the current permitted use of the Site as a (i) ship and boat building repair yard (the "Boat Repair Yard"), and (ii) water transportation and marine cargo handling facility engaging in stevedoring and other marine cargo handling of secondary metals among other commodities. SMM will depend on the Site's marine dock and access to the Providence River to load ships, barges and other marine vessels in connection with its operations (the "Marine Use").

As part of the diligence process in connection with the Site, I met with Peter Carnevale, City of Providence Zoning official on September 23, 2011. Mr. Carnevale confirmed that the Site is located within a W-3 zoning district, pursuant to which "Other Materials Processing, Distribution, and Storage" is permitted by right, provided that "such uses are part of a marine enterprise or are dependent upon access to the Port of Providence." *See* City of Providence Zoning Ordinance §303, Use Code 77.4 & n.2. In addition, the use of the Site as a Boat Repair Yard is permitted as a preexisting nonconforming use. *See* City of Providence Zoning Ordinance §200. Based upon the current operations and the Marine Use at the Site as described herein, please confirm by signing below that the current uses would be permitted by right pursuant to the terms of the City of Providence Zoning Ordinance.

Once signed, please return a copy of this letter to me by fax at (401) 455-0701. If you have any questions or concerns, please do not hesitate to contact me.

Very truly yours,

Joshua L. Celeste

Agreed to:

Jeffrey L. Lykins, Acting Director
Providence Department of Inspections and Standards

JLC/cmr
4843-7457-8955, v. 1

H

In The Matter Of:

Providence Piers v.

SMM New England

William Huling

April 15, 2014

Rhode Island Court Reporting

10 Dorrance Street

Suite 700

Providence

Rhode Island 02903

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UNITED STATES DISTRICT COURT
DISTRICT OF RHODE ISLAND

PROVIDENCE PIERS, LLC Plaintiff	)	
vs.	)	C.A. NO. 1:12-cv-00532s
SMM NEW ENGLAND, INC., et al Defendant	)	

DEPOSITION OF WILLIAM HULING, a 30(b)(6) Witness in the above-entitled cause, taken on behalf of the Plaintiff, before Patricia Quirk, CSR, a Notary Public in and for the State of Rhode Island, at the offices of KELLY MANCINI, 128 Dorrance Street, Providence, Rhode Island, on April 15, 2014 at 10:00 a.m.

PRESENT:

FOR THE PLAINTIFF....KELLY MANCINI
BY: MICHAEL A. KELLY, ESQUIRE

FOR THE DEFENDANT....ADLER, POLLOCK & SHEEHAN
BY: GEOFFREY MILLSOM, ESQUIRE
- and -
RICHARD BERETTA, ESQUIRE

ALSO PRESENT:

Brenna Force, Esquire, AP&S
Ken Marandola, Sims Metal Management

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REPORTER'S NOTE:
(NO EXHIBITS WERE MARKED IN THIS DEPOSITION)

10:47:47 the scrap yard?

10:47:48 MR. KELLY: Yes.

10:47:49 A. The scrap yard is four to five, that doesn't

10:47:53 change.

10:47:54 Q. And at the Allens Avenue, 242, we are talking

10:47:59 about, you have four to five employees working in

10:48:01 the scrap yard?

10:48:02 A. Uh-huh.

10:48:03 Q. Are there other employees that work there, other

10:48:06 than the four to five working in the scrap yard?

10:48:09 A. Yes.

10:48:09 Q. What do they do?

10:48:10 A. Marine repair.

10:48:13 Q. How many work on marine repair?

10:48:16 A. That's where I don't know the exact number.

10:48:19 Q. You are not in charge of that operation?

10:48:20 A. The manager of that operation reports to me.

10:48:24 Q. What's his name?

10:48:26 A. Michael Cohen.

10:48:28 Q. How many ships are at the site now being repaired?

10:48:33 A. Roughly five.

10:48:48 Q. Sims have any written fire prevention or mitigation

10:48:52 procedures or policies in regard to the scrap yard?

10:48:57 A. Written, I don't, I don't know.

10:49:00 Q. Pardon me?

I

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF RHODE ISLAND

PROVIDENCE PIERS, LLC, Plaintiff,	:	
vs.	:	C.A. NO. 1:12-cv-00532-S-PAS
SMM NEW ENGLAND, INC., Defendant.	:	

DEPOSITION OF MELISSA PLANTE, REGISTERED AGENT FOR

CLM ENTERTAINMENT GROUP, LLC

Tuesday, November 5, 2013

10:00 A.M.

ADLER, POLLOCK & SHEEHAN, INC.

One Citizens Plaza, 8th Floor

Providence, Rhode Island 02903

- - -

Linda S. Pezza, CSR
Capitol Court Reporting, Inc.
931 Jefferson Boulevard
Warwick, Rhode Island 02886
(401) 739-3600

APPEARANCES

For the Plaintiff:
JOSEPH P. PEMANTELL, JR.
LAW OFFICE OF MICHAEL A. KELLY, PC
128 Dorrance Street, Suite 300
Providence, Rhode Island 02903

For the Defendant:
BRENNA ANATONE FORCE, ESQ.
ADLER, POLLOCK & SHEEHAN, INC.
One Citizens Plaza, 8th Floor
Providence, Rhode Island 02903

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EXHIBITS

(DEFENDANT'S)

(COMMENCED AT 9:49 A.M.)

MELISSA PLANTE

Being duly sworn, deposes and testifies as follows:

THE REPORTER: Would you state your name for the record, please.

THE DEPONENT: Melissa Plante.

DIRECT EXAMINATION BY MS. FORCE

Q Hi, Melissa, my name is Brenna Force, I represent the Defendant in this case, SMM New England Corporation, which you probably know as the scrap metal --

A Sims.

Q -- site next to 200 Allens Avenue. So, we're here today to take your deposition as a third party witness in this case. So you're not involved in the litigation, no one is looking to point the finger at you, we're just trying to get the facts --

A Okay.

Q -- that you know to help us out with this case.

A Okay.

Q So with that being said, have you ever been deposed before?

A Never.

Q Okay. So there are sort of a few ground rules that I'm going to go over with you. Essentially, what's

going to happen is I'll ask you a series of questions, you'll answer them under oath, and then Joe, if he has any questions, he'll ask his as well, and the stenographer here will write down all the questions that I ask and all the answers that you give so we have a transcript, and because it's a written transcript, you know, if you nod your head or shake your head, it's not written down. So, it's kind of artificial where you have to say "yes" or "no" as opposed to what you normally do in conversation --

A Okay.

Q -- which would be shake -- shake your head, and the other thing is, you know, in conversations, sometimes we talk over each other, not to be rude, just because that's how people talk. So, it will look really messy on the transcript if we do that, so I'll try not to interrupt you, you try not to interrupt me. If you don't understand a question, let me know and I'll try to rephrase it so that you understand it. If you need a break, let me know, and do you need a drink? We have a bunch of options over there.

A No, thank you.

MS. FORCE: Joe, would you like something?

MR. PEMANTELL: I'll take a water.

Q Okay. And you will have, if you want, you can read and sign the deposition transcript, but you don't have

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good amount of sunlight coming in, and with the metal, it got so high that it was just an ugly view, so we had to put curtains up to block that out.

Q You mentioned that there were a couple of incidents where scrap has fallen from the neighboring property onto the 200 Allens Avenue property?

A Yes.

Q Can you describe those incidents?

A One day, I was sitting in my office with Don Fleck, and I heard a crash. We had had the garage bay open at the time, I believe it was in April, and I had asked him what that was, I assumed that it was just the normal dumping of the thing, and we looked over, and there was a piece of -- it looked like thick metal casting that came through our window and had broken our window.

Q What year did that occur?

A 2012.

Q Was the window replaced?

A Yes.

Q Do you know who replaced the window?

A I had called Lori Marchetti and she had sent somebody out to replace it.

Q Were there any other incidents in which you saw scrap falling from SMM's property onto the 200 Allens Avenue

27

property?

A Prior to the time where something came through my window, we would often see pieces fall over. At that time, Sims did not have a retaining wall built, so we could see things come over, you could hear pieces hit the building, and then, I believe it was September 2012, I was out of the office and I got a call from Mr. Fleck saying that a large nut had just fallen through another window and broken a different window. At which time, I called Lori Marchetti again and the window was replaced.

Q Did Don say that he got struck with the piece of scrap at that time?

A Yes, he was quite upset.

Q Can you tell me what he said about the incident?

A He was swearing, and basically said that this had to stop, that he didn't feel safe there anymore, that we needed to find another space to work out of.

Q Did he mention whether he was injured by the scrap that fell and hit him, or?

A He said it hurt his leg, but he's not the type of person to make a big thing out of it. He brought it to Sims attention, as we did when the other piece had fallen through.

Q Do you know if SMM did anything in response to

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either of those instances in which your windows broke?

A I don't know if it's in conjunction with or it was the timing, but after the first piece came through, a fence went up by Sims.

Q Did -- at any point, did you notice a decrease or stop in scrap metal falling from the Sims property onto the 200 Allens Avenue property?

A Yes, once the retaining wall went up with the fencing.

Q So since the wall with the fence went up, you haven't noticed any scrap falling?

A I have not personally, no.

Q Okay. Have you -- have you heard of anything from anyone else that scrap has fallen onto the 200 Allens Avenue property since the fence and wall went up?

A I have not. We really didn't have many neighbors at the time that we left.

Q So was the September 2012 incident that you described, in which the window broke and Mr. Fleck got struck with the scrap, the last time you witnessed or heard about scrap falling onto the 200 Allens Avenue property?

A After that time, we did see some pieces fall over.

Q And those pieces were before the wall and the fence went up?

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A Before the fence went up.

Q Okay. Did -- was Mr. Fleck alone when the window broke --

A Yes.

Q -- and the scrap -- okay. How has -- or has SMM's operations affected CLM's business?

A We needed -- we could no longer do the ride restoration, we had to give up that part of the company. I wasn't able, any longer, to work in the office space I had set up in the basement apartment -- in the basement section of it, because of the cracks in the walls and fear that something else would come through the window. We started working off of a coffee table set up away from the windows, and my heat costs went up, because of the cracks in the walls. The feces were everywhere, everywhere, and the dust just lined everything. I was no longer able to use my alarm system, because it kept -- the vibrations were setting off the alarm on the garage bay door and the police were getting called.

Q Why couldn't you do the ride restoration anymore?

A Because of the dust that we had, the paint wasn't settling right, it wasn't smooth anymore, it seemed to have particles in it.

Q Have you resumed ride restoration work now that

J

OHI

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January 27, 2014

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200 ALLENS AVENUE METALS STUDY

Mr. Michael A. Kelly, Esq.
Law Offices of Michael A. Kelly, PC
128 Dorrance Street, Suite 300
Providence, RI 02903

RE: Expert Report
Environmental Site Survey Study
SMM Metals Recycling
242 Allens Avenue
Providence, RI

Prepared by:

Robert Tuomanen CIH, CSP, CPEA
OccuHealth Inc.
44 Wood Avenue
Mansfield, MA 02048

Biographical Information, Professional Qualifications and Disclosure

My name is Robert William Tuomanen. I have been an environmental scientist for 36 years. I have specialized in the study of contaminants in the environment and workplace. I have extensive experience in the assessment of metals exposures. In 1977 I received a BS in Chemistry from Johnson State College. In 1988, I received a Master's Degree in Business Administration from Northeastern University. I am a Certified Industrial Hygienist, a Certified Safety Professional and a Certified Professional Environmental Auditor. I am a member of the American Board of Industrial Hygiene and the Board of Certified Safety Professionals. I have worked in both industry and consulting, in the field of Environmental Health and Safety throughout my professional career. I have testified in Federal Court and have been deposed in the Matter of Grace Christian Fellowship Church v. Colony Insurance Company et al. I have not been deposed within the last year.

ENVIRONMENTAL SURVEYS

Study 1.

On August 16, 2013, I conducted an environmental site survey of SMM Metals Recycling for the purpose of sampling metals in dust and soil in and around the scrap metal piles on the premises at 242 Allens Avenue, Providence RI. On August 22, 2013, I conducted an environmental site survey of the premises located at 200 Allens Avenue, Providence RI for the purpose of sampling metals in dust and soil located on the roof and inside the building.

Study 2.

I conducted a qualitative examination of the metals tested in the samples collected at each site described above. I conducted a quantitative assessment of the percent composition of the metals in the dust and soil samples collected at both sites. I have reviewed a five year wind rose plot obtained from data collected at two local airports close to the project sites. I have reviewed photographs of SMM Recycling site activity relative to the generation of dust and debris. I conducted a comparison of several anthropogenic metals in the samples taken at 242 and 200 Allens Avenue to metals content found in typical urban soils. I conducted a comparative analysis of metals concentrations in soil and dust collected at the HMS scrap pile at 242 Allens Avenue and the roof of 200 Allens Avenue.

EXPECTED TESTIMONY

- Testimony in regard to the metals content in dust and soil at 242 and 200 Allens Avenue,
- Testimony in regard to the generation of dust from operational activities at 242 Allens Avenue, Providence RI
- Testimony in regard to the percentage of metals characteristics in the dusts and soils at 242 and 200 Allens Avenue
- Testimony in regard to photographic evidence of airborne releases of dust and soil from grapple crane operations at the scrap pile located at 242 Allens Avenue. This work was conducted in such a way so as to cause airborne particulate matter to travel beyond the property line between the two sites.
- Testimony in regard to the State of Rhode Island Air Pollution Control Regulation No. 5 entitled "Fugitive Dust".
- Testimony in regard to toxic metals in the soil and dusts at 242 Allens Avenue and metals contamination at 200 Allens Avenue.

I may comment on the opinions and written reports of other experts retained in this matter. I reserve the right to supplement this report. My opinions are based on my education, training and experience, review of the materials provided to me and professional conclusions based upon scientific evidence I have personally collected.

Opinions and Basis of Expected Testimony - Objectionable Soils, Dusts and Toxic Metals Were Permitted to Contaminate the 200 Allens Avenue Building.

SITE INVESTIGATION

SMM Recycling Inc., 242 Allens Avenue, Providence RI

On the morning of August 16, 2013, Mr. Robert Tuomanen CIH, CSP, CPEA, Senior Project Manager and Mr. A. David Scarchilli, Vice President of OccuHealth Inc., conducted a site visit to SMM Recycling at 242 Allens Avenue, Providence RI. Mr. Tuomanen collected four soil and dust bulk samples from the base of the SMM HMS scrap metal pile. This scrap metal pile is located directly south of and adjacent to the property line at 242 and 200 Allens Avenue. Additional samples were also collected from three other scrap metal piles on the west side of the scrap metal yard. The soil material around the base of the HMS scrap pile was wet and contained metal scrap. Soil and dust material was collected off of asphalt. One earthen bulk sample included all material including soil and debris. The other three earthen samples were of soil and dust fines that were collected by hand or using a brush. The samples collected at 242 Allens Avenue were delivered to Alpha Analytical Laboratories in Mansfield Massachusetts for metals analysis. The samples were delivered by Mr. Tuomanen under a Chain of Custody. The laboratory dried and screened the samples using 200 mesh to separate out debris and large particulate. The samples were analyzed for metals using Inductively Coupled Plasma Emission Spectroscopy.

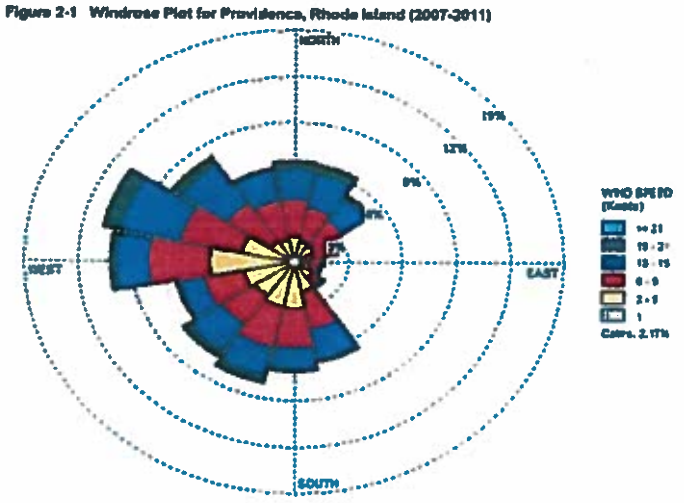
200 Allens Avenue, Providence RI

On the morning of August 22, 2013, Mr. Robert Tuomanen CIH, CSP, CPEA, Senior Project Manager of OccuHealth Inc., conducted a site visit to 200 Allens Avenue, Providence RI. During this site visit, Mr. Tuomanen collected seven (7) soil and dust wipe samples from the south roof of the building. Mr. Tuomanen also collected one (1) dust wipe sample from a south window sill inside the building located at 200 Allens Avenue. The indoor sample was taken from a space formerly occupied by a restaurant. The samples were collected using sterile wipes. Wipe samples were taken because the material was generally a fine dispersed particulate, unsuitable for bulk collection. In some locations, small amounts had clumped into corners and roof ridges. The size of each sample area was measured in square inches, varying from one (1) square inch to thirty six (36) square inches. The samples were delivered by Mr. Tuomanen to Alpha Analytical Laboratory in Mansfield Massachusetts under chain of custody. The samples were analyzed for metals using Inductively Coupled Plasma Emission Spectroscopy.

AREA METEOROLOGY

Five years of wind rose data was obtained from a private consultant. The meteorological data came from two local airports. The hourly surface meteorological data from the National Weather Service Station ID No. 14765 (Providence, TF Green Airport), including 1-minute ASOS wind data files, in addition to the upper air meteorological data from the NWS Station No. 14684 at the Chatham Municipal Airport, were used to develop the 5 year data file. The 16 wind rose data file is plotted in **Figure 1.** This figure illustrates that the wind is directionally SSE 6.5%, S 7% and SSW 7.5% over the five year period. Therefore, winds were generally from a southerly direction about 20% of the time interval, predominantly at about 6 to 15 knots. The local wind pattern along Allens Avenue may differ from this pattern due to winds off of the bay which are more southerly and stronger than inland.

Figure 1



SAMPLING METHOD AND RESULTS

The results of the samples collected at 242 Allens Avenue and 200 Allens Avenue were compared to determine if the metals present in the soil and dust samples taken around the scrap metal pile and the soil and dust swipe samples collected on the roof were similar in metals composition. Qualitative similarities would provide evidence that the soil and dust at the two sites were potentially from the same source.

- Twenty three (23) metals were tested in the four (4) samples taken around the base of the HMS scrap metal pile. In each of the four samples, all twenty three (23) metals were found in each sample. These metals were aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium and zinc.
- Twenty two (22) metals were tested in the seven (7) samples taken on the roof of 200 Allens Avenue and the one dust sample taken from a south facing window sill inside 200 Allens Avenue. Sixteen metals were found in the samples analyzed. Of the sixteen (16) metals found on the roof of 200 Allens Avenue, all sixteen (16) were found in the samples collected at the base of the HMS scrap pile at 242 Allens Avenue. The metals found at both 200 and 242 Allens Avenue were Aluminum, Arsenic, Barium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Vanadium and Zinc. The detection limits for the wipe samples may have been limited by the amount of material collected. In addition, Mercury was not tested in the swipe samples at 200 Allens Avenue due to laboratory analytical limitations. Therefore 16 of 22 elements tested were found at both sites.
- OHI conducted a quantitative profile of the predominant metals found at both sites. The percentages of these metals were compared to determine if the relative amounts of each of the common metals at both locations were similar. The results of the quantitative analysis of metals collected at the two sites are listed in **TABLE 1.**

DISCUSSION OF FINDINGS

Finding 1.

There are both qualitative and quantitative similarities between the dust and soil in the two locations. The dust profiles for iron, calcium, aluminum, zinc, lead, manganese, copper, chromium and nickel support the possibility that the material on the roof came from the HMS scrap pile. Based on this initial analysis, OHI decided to continue its investigation into the potential impact of SMM operations on the building at 200 Allens Avenue, specifically evidence that dust from the HMS scrap pile and was transported by wind across the fence line from 242 Allens Avenue to the 200 Allens Avenue site.

Finding 2.

The meteorology supported the likelihood that airborne fugitive dust would travel in the wind from the south. The wind speed can be significant (6-15 knots with gusts) as reported by the meteorological stations. It was reported that there was a restaurant located at this site. It routinely opened its windows for fresh air. Wire string is used to hold the windows in the open position and was still hanging in the sampled space at 200 Allens Avenue at the time of the survey.

Finding 3.

Figure 2 are photographs taken in 2013 of grapple cranes working on the HMS scrap pile on the SMM Recycling site, illustrating dust being generated by grapple crane operators. Soils and dust, visibly suspended in air, would impact the building at 200 Allens Avenue by a southerly wind (photo provided by Law Offices of Michael A. Kelly, PC). SMM Recycling recently installed a water spray system at the fence line to reduce dust emissions crossing the property line. The water spray, contaminated with particulate, is currently being carried by the wind onto and over the building at 200 Allens Avenue.

Finding 4.

Based upon the results at both sites, OHI investigated further to determine if the dust on the 200 Allens Avenue roof could have potentially been deposited from a downwind source further south of 242 Allens Avenue. Normally, a sample of soil would be taken south of the 242 site to demonstrate that it does not match the soil and dust profiles taken at 242 Allens Avenue. OHI staff was not able to access a local location south of SMM to take a sample. Therefore, we examined additional characteristics of the soil and dust at 200 and 242 Allens Avenue and made comparisons to normal urban soil data found in the literature. If the sample results differed widely from typical urban soils, and were qualitatively and quantitatively similar at both sites, definitive conclusions could be supported regarding the source of the roof soil and dust at 200 Allens Avenue. Several of the elements in the samples can be found in natural soils in relatively wide ranges. They occur naturally in earth and vary in concentration by location and soil type. These elements include iron, calcium, zinc, magnesium, sodium and manganese. Iron, zinc and other metals in scrap soil and dust are amplified by anthropogenic sources.

The results of our tests indicate a relative abundance of several of these metals, making the soil profiles unique. These metals include iron, aluminum, cadmium, chromium, lead, nickel, copper, arsenic, manganese and zinc. A profile of these metals in the samples taken from 242 Allens Avenue, were compared to the literature. The results of this review are in **TABLE 2** below. The percentage of these metals in the soil and dust collected at both sites was then reviewed and is presented in **TABLE 3.**

TABLE 2: Metals Found in Soils from Anthropogenic Sources vs. 242 Allens Avenue

Metal	Urban Soil Mg/Kg	SMM Scrap Pile Mg/Kg
Iron	200 to 2000[1]	139,250
Arsenic	4.1[2]*	19.3
Barium	73[2]	643
Chromium	24[2]	272
Aluminum	2500[1]	9618
Zinc	60[3]	6310
Manganese	260[2]	1231
Copper	17[2]	961
Cadmium	1.0 (0.1-1.8)[3]	28
Nickel	6.4[2] -28	231
Lead	45[2], 400[3]	1433
Mercury	0.023[2]	6.9

***Refer to reference number in the Appendix**

Notes:
(1) OHI was not interested in conducting a global literature study of metals in soils. Several studies of urban soils were reviewed. Concentration differences of 5X to ≥ 10X were of interest.
(2) Lead concentration in urban soil has been extensively studied by EPA. Concentrations of lead in urban soil are typically under 400 (mg/Kg dry weight).

TABLE 3: Mean Percentages of Anthropogenic Metals at 242 and 200 Allens Avenue

Metal Tested	242 Allens Avenue	%Dev	200 Allens Avenue
Iron	69%	23	57%
Aluminum	5.0%	9	8.3%
Zinc	3.1%	35	3.6%
Lead	0.7%	13	0.8%
Manganese	0.6%	19	0.6%
Copper	0.5%	6	0.7%
Nickel	0.1%	9	0.1%
Cadmium	<0.1%	25	<0.1%
Chromium	0.1%	23	0.2%

Notes:
(1) Comparative percentage profiles of metals and dusts of interest at 200 and 242 Allens Avenue are similar (≤2X). Ranges were expectedly broad. Therefore, metals of interest were those uniquely elevated compared to urban soil.
(2) Soil and dust samples have similar concentrations of metals of interest at both sites.
(3) % deviation = mean/standard deviation x (100) of the sample for comparative purposes.

Finding 5.

The concentrations of numerous metals from the HMS scrap pile are significantly amplified above urban soil literature data. In addition, they are qualitatively and quantitatively similar at both site locations tested in this study. The soils are unique and similar. **Figure 3.** This evidence further supports the conclusion that the source of soil and dust at 200 Allens Avenue is the scrap metal pile on the SMM Recycling site. In addition, the metals profile of the 200 Allens Avenue roof samples and a sample taken inside 200 Allens Avenue are similar. See Appendix Table A1 and Table A2.

Finding 6.

EPA considers a concentration of lead in soil between 400 and 2000 mg/kg to be moderately high. 45 mg/KG is referenced in the literature for urban soil. The level of lead detected in the HMS scrap metal soil and dusts samples was 1433 mg/kg. OHI took a dust sample from the window of the restaurant. The concentration of lead found on the window sill exceeded the allowable EPA abatement clearance limit. The result is provided in TABLE 4 below.

TABLE 4: Lead Content in Indoor Dust, 200 Allens Avenue

Location	Lead Concentration	EPA Allowable Limit
Window Sill Dust Inside 200 Allens Avenue Building	13680 ug/ft^2	250 ug/ft^2

The concentration of lead in soil at the SMM scrap pile is elevated. The dust on the interior window sill is highly elevated for lead. The window sill sample exceeds the EPA clearance limit for re-occupancy of a residence following abatement.

Finding 7.

Renovations at 200 Allens Avenue are likely not the source of lead in the building. There were no paint chips or paint dusts. The dust on the window sill was visibly similar to the dust found on the roof. This opinion is supported by the observation that the dust had accumulated only on the southern window sills of the building, next to the 242 Allens Avenue site.

Finding 8.

A cumulative bulk sample of soil and dust was taken from the roof of 200 Allens Avenue on May 6, 2013. The sample was analyzed for hexavalent chromium, iron, lead and mercury by RI Analytical. These results were compared by OHI to the sample results taken by Mr. Tuomanen at the base of the HMS scrap pile at 242 Allens Avenue. The results are quantitatively similar and elevated compared to normal urban soils. The results are included in **Table 5.**

Figure 3. Site Percent Metals Composition

200 Allens Avenue Roof

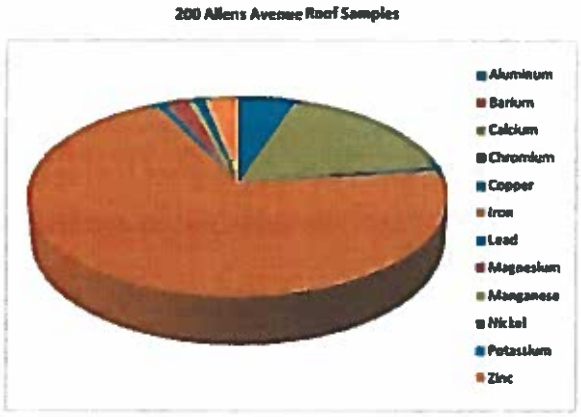
Aluminum	5%
Barium	0%
Calcium	17%
Chromium	0.1%
Copper	0.5%
Iron	69%
Lead	0.7%
Magnesium	2.1%
Manganese	0.6%
Nickel	0.1%
Potassium	0.8%
Zinc	3.1%

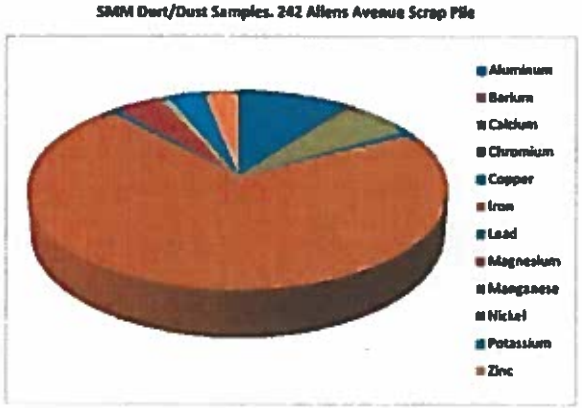
SMM Dust/Dust Samples

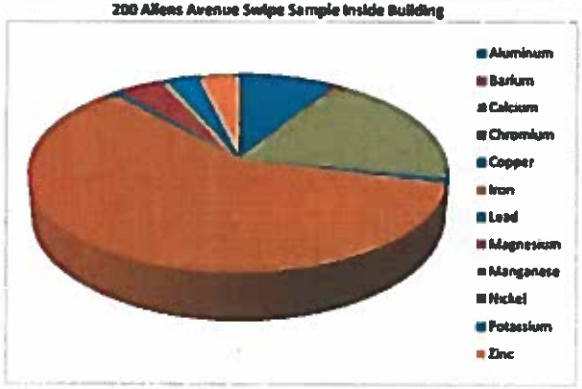
Aluminum	10%
Barium	0.4%
Calcium	6%
Chromium	0.2%
Copper	0.7%
Iron	70%
Lead	0.7%
Magnesium	4.1%
Manganese	0.8%
Nickel	0.1%
Potassium	3.1%
Zinc	3.1%

Inside Window Sill, South Side 200 Allens Ave

Aluminum	8%
Barium	0.5%
Calcium	18%
Chromium	0.1%
Copper	0.7%
Iron	57%
Lead	0.8%
Magnesium	3.7%
Manganese	0.6%
Nickel	0.1%
Potassium	2.6%
Zinc	3.6%







Comparison of Metals Composition

200 Allens Avenue Roof and SMM Scrap Metal Pile

PREDOMINANT METALS

Contaminant	Percent Composition of Metals on 200 Allens Avenue Roof	Percent Composition of Metals at SMM 242 Allens Avenue Scrap Metal Pile	Comments	Contaminant	Percent composition of Metals in dust inside 200 Allens Avenue	Comment
Aluminum	5%	10%	Primary constituent of samples from both test sites	Aluminum	8.3%	In range
Barium	0%	0.4%	Low	Barium	0.5%	Similar to SMM site
Calcium	17%	6%	Primary constituent from both test sites	Calcium	18.1%	Similar to 200 roof
Chromium	0.1%	0.2%	Same amount at both test sites. Minor constituent of both sample sets	Chromium	0.1%	In range
Copper	0.5%	0 7%	Same amount at both test sites. Minor but important constituent of both sample sets	Copper	0.7%	Indentical
Iron	69%	70%	Same amount in both tests. Iron is by far the primary constituent in samples from both sites	Iron	56.9%	Indentical
Lead	0 7%	0.7%	Same amount at both test sites	Lead	0.8%	Identical
Magnesium	2.1%	4.1%	Moderate constituent at both sites	Magnesium	3.7%	In range
Manganese	0.6%	0.8%	Same amount at both test sites. Minor constituent of both sample sets	Manganese	0.8%	Same as 200 roof
Nickel	0.1%	0.1%	Same amount at both test sites	Nickel	0.1%	Identical
Potassium	0.8%	3.1%	Amounts are close at both sites	Potassium	2.6%	Similar to SMM site
Zinc	3.1%	3.1%	Same amont at both test sites.	Zinc	3.6%	Similar to both sites
Total Percent	99%	99%	Measured the same total percentage		96%	Similar total percentage

Table 5: Comparative Summary of 200 Allens Avenue Roof and 242 Allens Avenue HMS Scrap Pile

Metal Tested in Sample	200 Allens Avenue	242 Allens Avenue (Average and Range)
Cadmium	19 mg/kg	27.9 mg/kg (19.8 – 40)
Iron	110,000 mg/kg	139250 mg/kg (107,000 – 184,000)
Lead	1100 mg/kg	1433 mg/kg (1060 – 1940)
Mercury	2.3 mg/kg	6.89 mg/kg (3.69 – 15.1)

SUMMARY

There is currently sufficient evidence that the dust on the roof and inside the building at 200 Allens Avenue is fugitive dust from the SMM Recycling operation at 242 Allens Avenue. The evidence is summarized below:

1. The qualitative and quantitative profiles of the soils and dusts at the two sites are similar.

2. The meteorological wind rose plot indicates that winds are from the south 20% of the time over a five year period based on local airport National Weather Service data.

3. Photography over the summer of 2013 illustrates significant dust suspension in air during grapple crane work on the HSM scrap pile. This fine soil and dust was transported to the 200 Allens Avenue building during southerly winds. The winds from the south are recorded between 6 and 15 knots with higher gusts. A water spray from the 242 Allens Avenue fence line is currently carrying onto and over the roof at 200 Allens Avenue. These water droplets are contaminated with particulate from the HSM scrap pile.

4. Metals found in soil from anthropogenic activity, namely iron, aluminum, zinc, manganese, copper, cadmium, chromium, nickel and lead were all found in elevated concentrations in the samples taken from the HSM scrap pile compared to urban soil. The percentages of these metal concentrations correlated well between the two sampling sites.

5. Lead was found in elevated concentrations at both sites in soil and dust. The amount of lead found inside of the building on the window sill was above the EPA clearance limit for abatement. The dust found on the roof and on the window sill at 200 Allens Avenue was earthen in nature. There were no visible paint chips or finely sanded paint dust particles. The material on the window sill was visibly similar to the earthen soil and dust material found on the south side of the 200 Allens Avenue roof. Photographic evidence demonstrates that the HSM scrap pile operation produces visible levels of dust which was carried to the 200 Allens Avenue roof in southerly winds at the time of OHI's site visits.

6. The quantitative metals testing of the samples on the roof of 200 Allens Avenue for cadmium, iron, lead and mercury is similar to the soil samples collected in and around the HMS scrap pile at 242 Allens Avenue. All four metals were detected in similar concentrations.

7. Metal contamination entered the restaurant windows causing a potential health risk to those who sat near the open windows consuming food. Potential routes of exposure include both inhalation and ingestion.

8. SMM Recycling is in violation of RI Department of Environmental Protection (RIDEM) Air Pollution Control Regulation 5, Fugitive Dust. Photographic evidence presents evidence that a source exists. Metals sampling has demonstrated that the source is unique and dissimilar to urban soil. In addition, metals sampling of the source dust from the HSM scrap pile and dust located on the roof of 200 Allens Avenue are qualitatively and quantitatively similar in metals content. The levels of metal in dirt and dust at both sites are significantly elevated above urban soil levels researched in the literature

9. It is likely that the metal contamination that settled onto the roof of the building at 200 Allens Avenue washed onto the site and entered Providence Harbor.

CONCLUSION

The summary of evidence indicates that grapple crane operations at the HMS scrap pile produce visible dust suspended in air. Plotted wind rose data indicate that southerly area wind transported the suspended airborne particulate from the HMS scrap pile operation across the fence line at 200 and 242 Allens avenue impacting the 200 Allens Avenue building. Metals sampling data support this conclusion. The earthen soil and dust lead content is significantly elevated at 242 Allens Avenue HSM scrap pile, on the roof of 200 Allens Avenue, and inside the building at 200 Allens Avenue on the side facing the scrap yard.

The qualitative and quantitative metals profiles of the soil and dust samples taken at both sites were similar indicating the source is likely the HMS scrap operation at 242 Allens Avenue. Anthropogenic metals content of the soils and dust at each site were qualitatively and quantitatively similar. The dust and dirt tested at both sites is both similar and unique. The cadmium, iron, lead, mercury and other metal concentrations of the soil and dust samples taken from the base of the scrap pile at 242 and the roof of 200 Allens Avenue are similar.

Earthen dust tested inside the 200 Allens Avenue building taken from a southerly window sill of an abandoned restaurant had a significantly elevated lead concentration. Airborne dust containing elevated lead levels has been photographed at the HSM scrap pile. It is reasonable to conclude that soil and dust from the scrap pile operation at 242 Allens Avenue has crossed the property line onto 200 Allens Avenue and impacted the outside and interior of the building at 200 Allens Avenue. This potentially caused significant health risks to patrons at the restaurant and restaurant employees at the 200 Allens Avenue site. The potential for harbor contamination and a violation of RIDEM Air Pollution Control Regulations exists.

Please call if there are any questions regarding the contents of this report.

Regards,
OCCUHEALTH, INC.

Robert Tuomanen, CIH, CSP, CPEA
Senior Project Manager

A. David Scarchilli, P.E., BCEE
Vice President

Appendix

Literature Citations

1. http://www.yale.edu/fes519b/pitchpine/results2.html *Metals in clean soil; The Movement of Metals in the Soil of a Pitch Pine Forest; www.yale.edu*
2. *Soil Metal Concentrations and Toxicity: Associations with Distances to Industrial Facilities and Implications to Human Health, NIH Public Access. www.ncbi.hlm.nih.gov*
3. *Soil Facts, Minimizing Risks of Soil Contaminants in Urban Gardens, State University A&T State University*
4. *Guidance for Arsenic in Soil, Office of Waste Management; Policy Memo 00-0, Rhode Island Department of Environmental Management*
5. *Air Pollution Control Regulations No. 5 Fugitive Dust; Rhode Island Department of Environmental Management*

Figures

1. Google Maps- 200 Allens Avenue
2. Windrose Plot for Providence Rhode Island
3. Monthly Wind Direction and Speed in Providence Harbor
4. OHI Notes; Plot Map and Sampling Points. HMS Scrap Pile
5. OHI Notes; Plot Map and Sampling Points. 200 Allens Ave. Roof & Window Samples
6. Table A-1; Summary Results Table, SMM HMS Recycling Scrap Pile
7. Table A-2; Summary Results Table, 200 Allens Avenue Roof and Window Sampling

Analytical Results and Chain of Custody

1. COC & Analytical Results; 242 Allens Avenue HMS Scrap Pile Bulk Samples (Alpha Analytical)
2. COC & Analytical Results; 200 Allens Avenue Roof Wipe Samples (Alpha Analytical)
3. COC & Analytical Results; 200 Allens Avenue Roof Bulk Samples (RI Analytical

Movement of Metals in the Soil of a Pitch Pine Forest

Results and Discussion

Iron

The amount of iron (Fe) increased by 1.14 g (5.13 %) in the forest floor while increasing by 74.6 (9.9 %) in the mineral soil, for a net increase of 75.7 g (9.8 %) to the system between 1990 and 1998.

Forest Floor

In the forest floor between 1990 and 1998, iron increased approximately 5 % in amount, but, due to an increase in forest floor mass, it decreased in concentration by approximately 9 %. The cause of these changes is unknown.

Mean Amounts and Concentrations of Iron in the Forest Floor

	1990	1998	Change	% Change
Amount (g/cm/m^2)	4.44	4.66	1.14	5.1 %
Concentration (ug/g)	2332.0	2133.2	-198.9	-8.5 %

[click here for complete set of iron forest floor values]

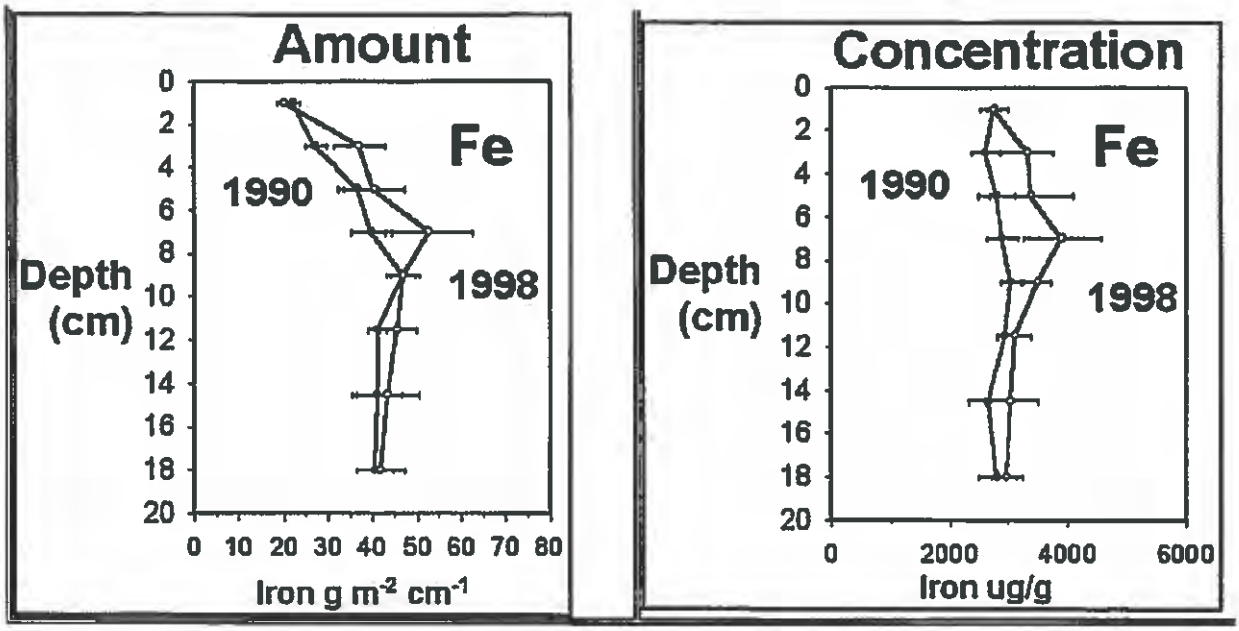
Mineral Soil

Between 1990 and 1998, the amount of iron in the mineral soil increased by approximately 10 %. The largest increases in amount happened in the upper four thickness layers (0-8 cm), while concentrations increased throughout the profile.

Iron primarily originates from chemical weathering of the parent material and is not absorbed by plants in appreciable quantities; the amount found in plants is several orders of magnitude lower than the amount in mineral soil (Heinrichs and Mayer, 1980). Its movement in soil horizons is due mainly to chemical processes within the soil, rather than association with organic matter or uptake by biomass. Therefore, its distribution patterns exemplify the chemical redistribution occurring as the soil restratifies into horizons. In fact, the distinctive color of the soil horizons are caused by iron. Its presence gives the reddish tint to the Bhs and Bs horizons, and its absence leaves the E horizon a light gray color.

This vertical distribution of iron therefore exemplifies the podzolization that is occurring at this site. The change between 1990 and 1998 is typical of the way many elements have increased in concentration and amount between 0-8 cm, with the largest accumulation creating a "bulge" between 6-8 cm. At this point in time, the 6-8 centimeter segment is the primary zone where increases are accumulating, with only minimal increases below 8 cm.

Iron in the Mineral Soil



Manganese

Manganese amount increased by .18 g (14 %) in the forest floor, while the mineral soil amount increased 3.5 g (31 %) for a net increase of 3.7 g (29 %) to the system.

Forest Floor

Manganese amount increased by .18 g (14 %) in amount and .27 ug/g (0.21 %) in the forest floor between 1990 and 1998. The table below shows the mean values of amount and concentration in the forest floor from the 1990 and 1998 samples. Amount increased more than concentration due to a higher forest floor mass.

Mean Amounts and Concentrations of Manganese in the Forest Floor

	1990	1998	Change	% Change
Amount (g/cm/m^2)	1.25	1.42	.18	14 %
Concentration (ug/g)	131.6	131.9	.27	0.21 %

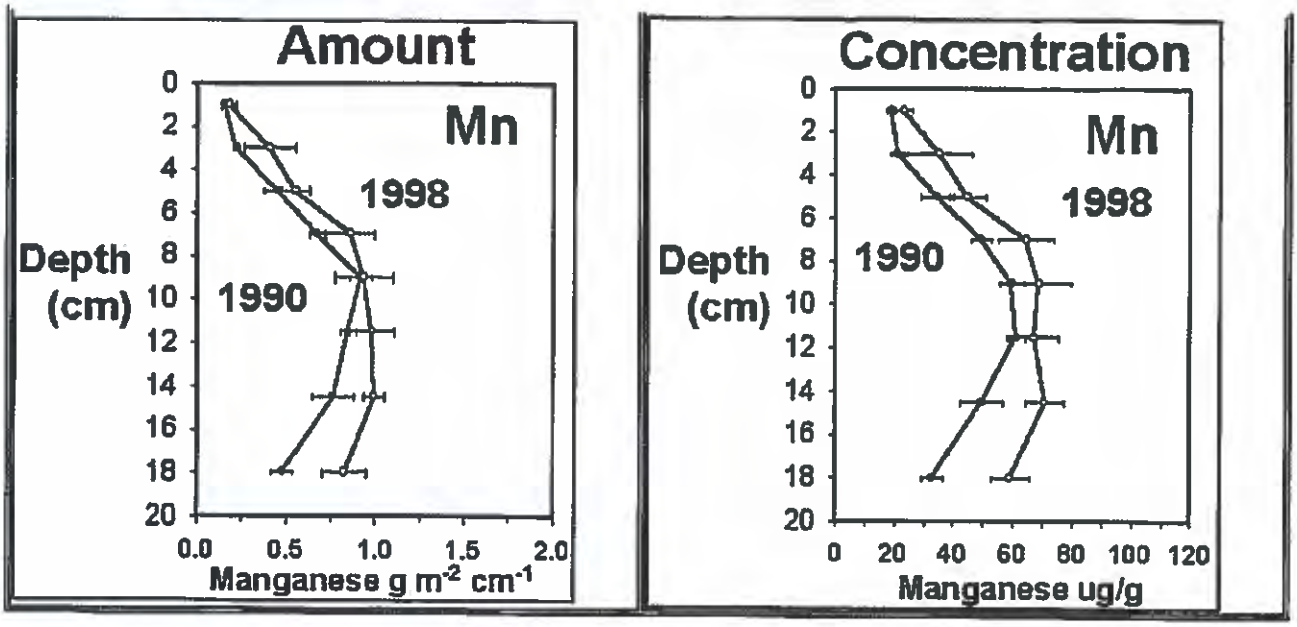
[click here for the complete set of forest floor Mn values]

Mineral Soil

Manganese amounts and concentrations increased fairly steadily throughout the soil profile. The net increase in amount was 3.5 g (2 %), while concentration increased .18 g (14 %). The increase in amount was notably small between 8-10 cm, while a bulge is present at 6-8 cm, suggesting manganese is accumulating at 6-8 cm at the expense of the soil beneath. The increases are largest in the two deepest thickness segments (13-16 cm and 16-20 cm).

The two major sources for manganese in soil are mineral weathering and organic matter decomposition, while anthropogenic emissions account for only 11 % (Heinrichs and Mayer, 1980; Nriagu, 1989). Manganese is chemically similar to iron and its distribution is also mostly determined by chemical soil properties, rather than biological activities. It is not known whether the increase is due to an increase in human activities, accumulation of weathered manganese, or increased rate of weathering.

Manganese in the Mineral Soil



Potassium

Potassium decreased .09 g (1.8 %) in the forest floor, while increasing 3.7 g (4.2 %) in the mineral soil, for a net increase of 3.62 g (3.86 %) between 1990 to 1998.

Forest Floor

Within the forest floor, the amount of potassium decreased .09 g, or 1.25 %, while the concentration decreased 80 ug/g (14 %) in the years between 1990 and 1998. This decrease suggests more potassium is being leached from the forest floor than is accumulating from deposition or decomposition of organic matter. The percent decrease in concentration was larger than the percent change in amount because of an increase in forest floor mass.

Mean Amounts and Concentrations of Potassium in the Forest Floor

	1990	1998	Change	% Change
Amount (g/cm/m^2)	1.07	1.05	-.094	-1.8 %
Concentration (ug/g)	576.3	495.8	-80.5	-14 %

[click here for complete set of potassium forest floor values]

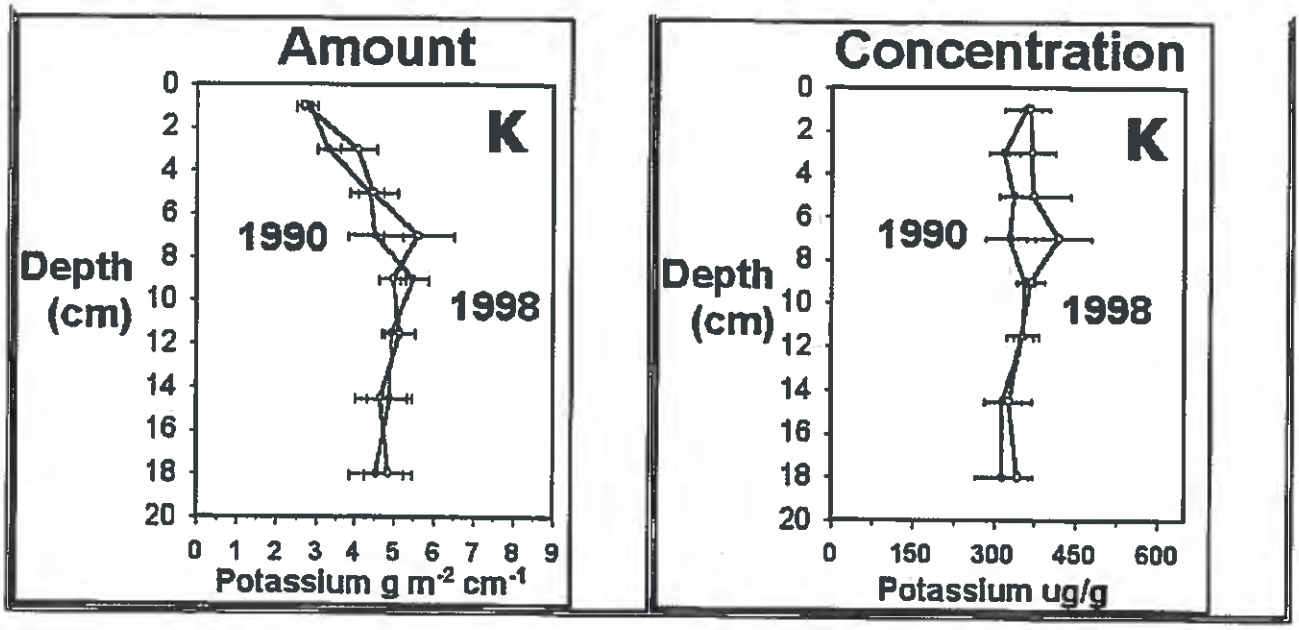
Mineral Soil

Potassium increased in the mineral soil by 3.7 g (4.2 %). The amounts appeared not to change, except for a slight bulges at 2-4 cm and 6-8 cm. The concentrations show a general increase between 0-8 cm.

The distribution of amounts did not change significantly. The increases in amounts were accumulated in "bulges" at 2–4 cm and 6-8 cm. The concentrations of potassium did increase between 2-8 cm and "bulge out" between 6-8 cm.

The primary source of potassium is chemical weathering from rocks, and the arkosic glacial till that forms the upper layer of the parent material is high in potassium feldspar (right?). This mineral is cycled very rapidly through the ecosystem; plants take it up in high quantities and then release it to the soil when they decompose. It is highly soluble and can leach easily through soil. For these reasons, it was not expected that the patterns of potassium distribution would change much, but they change in much the same manner as the other elements, forming a bulge of accumulation between 6-8 cm depth, with very little change seem below that depth.

Potassium in the Mineral Soil



Aluminum

Aluminum (Al) increased 1.6 g (6.1 %) in the forest floor, while decreasing 87.9 g (7.5 %) in the mineral soil, for a net decrease of 86.3 g, or 7.2 % between 1990 and 1998.

Forest Floor

The forest floor amount increased ~ 6 % in the forest floor between 1990 and 1998, while a larger increase in forest floor mass caused the concentration to decrease by ~7 % (see table).

Mean Amounts and Concentrations of Aluminum in the Forest Floor

	1990	1998	Change	% Change
Amount (g/cm/m^2)	5.14	5.45	1.56	6.1 %
Concentration (ug/g)	2706.7	2513.4	-193.3	-7.1 %

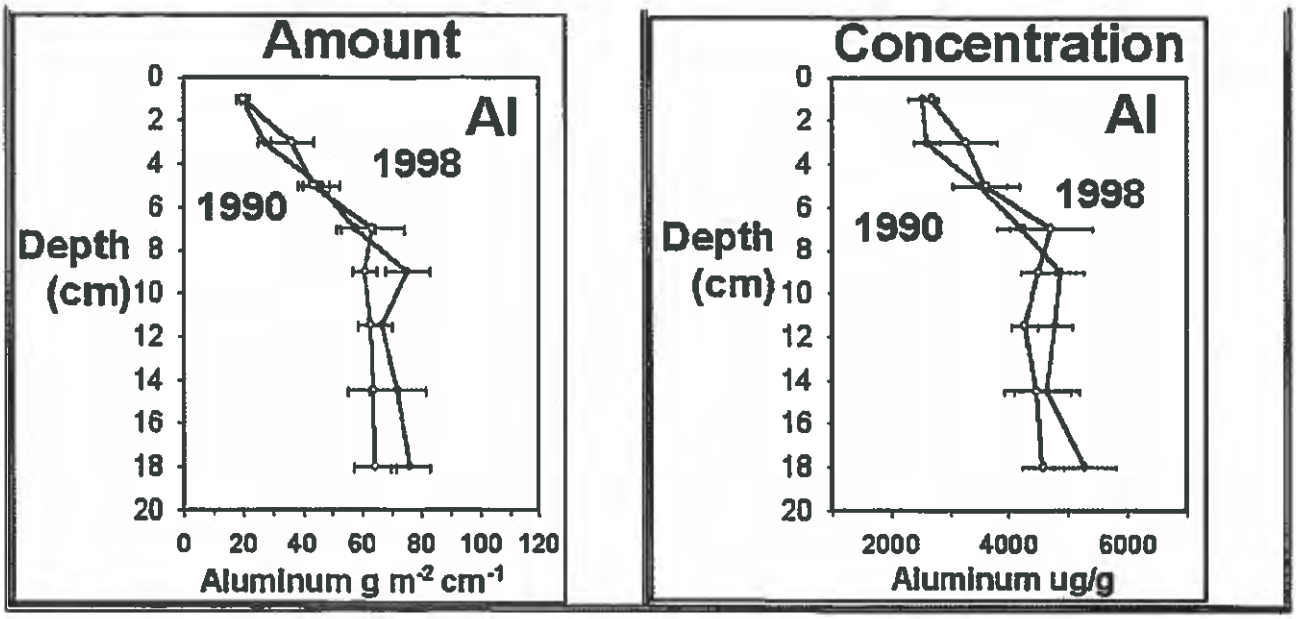
[click here for complete set of aluminum forest floor data]

Mineral Soil

In the mineral soil, the amount of aluminum decreased by 87.9 g/cm/m^2 (7.5 %), and the concentration increased by 1.6 ug/g (6.1 %).

The distribution of aluminum's amount and concentration between 0-8 cm did not change greatly between 1990 and 1998. The amounts and concentrations of aluminum also show "bulges" at 2-4 cm and 6-8 cm, as part of the general podzolization. Below 8 cm, however, both the concentration and amount of aluminum have decreased in the 8 years. Perhaps the decreasing concentrations in the forest floor are causing a larger percentage of non-polluted organic matter to decompose into the soil, causing the decrease in mineral soil amounts. The primary sources of aluminum are mineral weathering and reprecipitation (dissolving in the acidic upper layers, leaching downward, and then depositing at a lower depth). Therefore, a decrease in the aluminum inputs could affect lower layers fairly quickly.

Aluminum in the Mineral Soil



Phosphorous

The amount of phosphorous (P) decreased by .061 g (1.0 %) in the forest floor, while decreasing 4.7 g (7.7 %) in the mineral soil, for a net decrease of 4.76 g (7.1 %) to the system between 1990 to 1998.

Forest Floor

The amount of phosphorous showed in the forest floor showed a slight decrease in amount and a larger decrease in concentration (see table). An increase in forest floor mass caused the concentration to decrease by more than the amount did.

Mean Amounts and Concentrations of Phosphorous in the Forest Floor

	1990	1998	Change	% Change
Amount ($g/cm/m^2$)	1.22	1.20	-.06	-1.0 %
Concentration (ug/g)	660.9	562.3	-98.5	-14.9 %

[click here for complete set of phosphorous forest floor values]

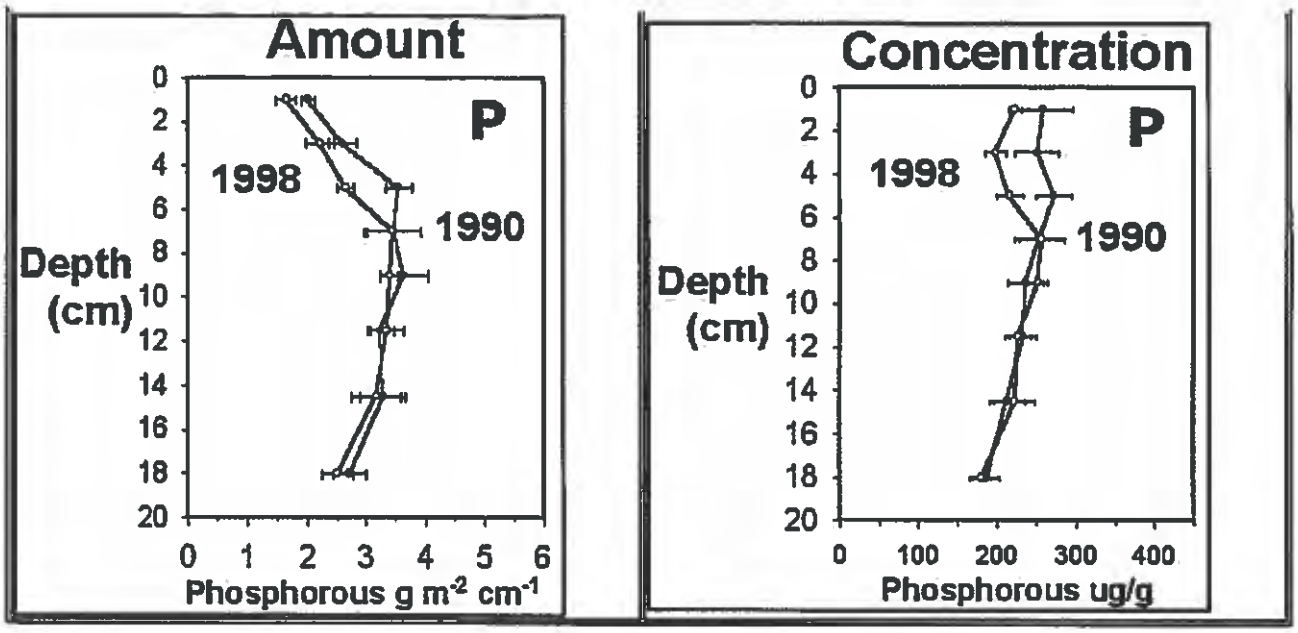
Mineral Soil

Phosphorous in the mineral soil decreased in both amount and concentration, especially in the upper 6 cm. The total decrease in amount was 4.7 g (7.7 %), and 35 % of this decrease occurred between 0-6 cm. Below 6 cm, little change in amount or concentration is seen in the 8 years. Interestingly, while aluminum is decreasing in the lower horizons, phosphorous is decreasing in the upper horizons.

The trend for increasing amounts from 0-6 cm and then a decrease is the same trend seen in many other metals. The formation of soil horizons is pauperizing the upper horizons, which will become an E horizon, and accumulating the metals between 4-8 cm, where a Bhs horizon will form.

Phosphorous generally originates from the weathering of parent rock. It is rapidly taken up by biomass and released when plants decompose. In the soil, it is strongly associated with organic matter; organic matter and phosphorous amounts correlate almost linearly in soil. Since phosphorous generally leaches quickly in acidic soils (Heinrichs and Mayer, 1977), and it appears that it is leaching out of this system.

Phosphorous in the Mineral Soil



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Soil metal concentrations and toxicity: Associations with distances to industrial facilities and implications for human health

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Abstract

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Urban and rural areas may have different levels of environmental contamination and different potential sources of exposure. Many metals, i.e., arsenic (As), lead (Pb), and mercury (Hg), have well-documented negative neurological effects, and the developing fetus and young children are particularly at risk. Using a database of mother and child pairs, three areas were identified: a rural area with no increased prevalence of mental retardation and developmental delay (MR/DD) (Area A), and a rural area (Area B) and an urban area (Area C) with significantly higher prevalence of MR/DD in children as compared to the state-wide average. Areas were mapped and surface soil samples were collected from nodes of the uniform grid. Samples were analyzed for As, barium (Ba), beryllium (Be), chromium (Cr), copper (Cu), Pb, manganese (Mn), nickel (Ni), and Hg concentrations, and for soil toxicity and correlated to identify potential common sources. ArcGIS® was used to determine distances between sample locations and industrial facilities, which were correlated with both metal concentrations and soil toxicity. Results indicated that all metal concentrations (except Be and Hg) in Area C were significantly greater than those in Areas A and B ($p \leq 0.0001$) and that Area C had fewer correlations between metals suggesting more varied sources of metals than in rural areas. Area C also had a large number of facilities whose distances were significantly correlated with metals, particularly Cr (maximum $r = 0.33$; $p = 0.0002$), and with soil toxicity (maximum $r = 0.25$; $p = 0.007$) over a large spatial scale. Arsenic was not associated with distance to any facility and may have different anthropogenic, or a natural source. In contrast to Area C, both rural areas had lower concentrations of metals, lower soil toxicity, and a small number of facilities with significant associations between distance and soil metals.

Keywords: Arsenic, chromium, mental retardation and developmental delay, rural surface soils, urban surface soils, soil contamination, TRI

Introduction

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In urban areas, industrial sources with specific releases of metals often impact surrounding soils (Douay et al., 2007) and these soils may pose a health risk. Pilgrim and Schroeder (1997) measured elevated concentrations

of Cd, Cu, Pb, and Zn in urban areas, and Chen et al. (1997) found urban soils to have significantly higher mean As, Cd, Cu, Pb, and Zn concentrations than forest and rural soils, although some forest soils also contained elevated concentrations of As, Cu, and Pb. Most metals found in urban and rural soils have both natural and anthropogenic sources, and thus are site-specific; source identification is needed to effectively mitigate and reduce potential human exposure.

In many cases, children and pregnant women are most susceptible to negative health effects from metals in soils (Calderón et al., 2003). The neurological effects of Pb, As, and mercury (Hg) have been well documented (Abernathy et al., 1999; Factor-Litvak et al., 1999; Wasserman et al., 2004; Rothenberg and Rothenberg, 2005; Trasande et al., 2005), but other metals, such as Cr, Cu, and Ni, also may have potential negative neurological impacts (Rowbotham et al., 2000; ATSDR, 2008). Caussy et al. (2003) reported that for As, soil and dust were relevant media and water was a highly relevant medium for exposure. Soils and dust also were relevant media for exposure to Cr, Pb and Hg compared to air, water, and food, particularly for Pb due to soil ingestion by toddlers. Soil metals in urban areas may be bioavailable, as elevated blood concentrations of Pb in children (Thornton et al., 1990; Mielke et al., 2007) and Cd in adults (Hogervorst et al., 2007) have been associated with soil metal concentrations. The associated increased risk to human health and potential negative health effects due to toxic metals in soils is of concern for exposed, and in particular susceptible, populations.

This study is part of a broader study which is investigating concentrations of metals in soils over large spatial scales as a general indicator of environmental insult, and associations of metal concentrations and toxicity with incidences of mental retardation and developmental delay (MR/DD) in children. The prevalence of MR in the US during late childhood has been reported to be 1–2 % of the population during the past decade, but there is substantial variation in the literature (McDermott et al., 2007). Sturm et al. (2003) found geographical variations in mental health needs for children, with need varying from ~5 % in New Jersey to as high as 9.5 % for Mississippi (national average of 7.1 %). When the broader category of developmental delay (DD) is included, depending on the population surveyed and the methods used, the estimate of MR/DD prevalence ranges from 10–15 % of school age children (McLaren and Bryson, 1987; Drillen et al. 1988; Simeonsson and Sharp, 1992; Massey and McDermott, 1996; Stevenson, 1996).

In the current study, we compared concentrations of metals and soil toxicity in urban and rural areas (both with MR/DD risk significantly greater than background risk), and in a reference rural area (with MR/DD risk similar to that of the state average) to determine whether the urban area had greater soil toxicity and concentrations of metals than the rural areas, and whether greater concentrations of metals were associated with the MR/DD clusters compared to the reference area. Within each area, correlations between metals were used as an indication of commonality of metal sources, which could be anthropogenic or natural. Finally, the distance between the locations of industrial facilities to the soil metal concentrations and soil toxicity values at each sampling location were correlated within each area. Soils were not collected at the residences of case and control mother-child pairs, nor in close proximity to industrial facilities, but instead were collected on a regularly-spaced spatial grid throughout the MR/DD cluster and reference areas. The intent of this study was not to identify a particular facility that could be polluting a defined area and contributing to the MR/DD outcome. Rather, we investigated the potential of both natural and anthropogenic sources to contribute to soil metal concentrations and soil toxicity, and whether metals were distributed differently within MR/DD and reference areas in order to make recommendations to reduce sources and human exposure via surface soils.

Materials and Methods

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All study areas were established by address matching records to determine MR/DD risk for each month of pregnancy for the years 1996–2001. All known causes (e.g. genetic and chromosomal syndromes, traumatic or infectious causes) of MR/DD were removed from the database and only unknown causes of MR/DD were retained. Based on Bayesian hierarchical modeling, which uses a local likelihood parameter, clusters of MR/DD were identified using methods described by Zhen et al. (2008). With this method, cluster areas are not

restricted to circular areas but instead are defined by irregular shapes as determined by the accumulation of cases versus controls within the areas. A second benefit of the Bayesian modeling is that a continuous risk map is generated in which outcome risk gradients are identified within each cluster area.

One reference and two MR/DD cluster sites were identified for study in a state located in the Southeastern USA. The average MR/DD prevalence rate for Area A (0.14), the reference area, was not different than the state background prevalence rate (0.19). MR/DD prevalence rates for Areas B (0.49) and C (0.25) were significantly higher than that of the state background. An area that cut through the identified MR/DD clusters and through different gradients of MR/DD risk were selected for soil sampling. Sampling was based on a regular grid throughout each area; thus soil sampling nodes were not associated directly with locations of cases and controls within the areas because the residence locations and identity of the study population were confidential for the soil sampling component of the study. The nodes were mapped using ArcGIS® Version 9.2 software (ESRI, 1999–2005). City, county, and road map layers were added to the map for navigation purposes. Sampling occurred as close to 120 grid nodes as possible (Aelion et al., 2008).

An urban area is defined as a location within an urbanized area (UA) or urbanized cluster (US Census, 2002). An UA has a residential population of at least 50,000, an overall population density of at least 1000 people per square mile, and surrounding census blocks that have an overall density of at least 500 people per square mile. The US Census defines a rural location as one that is not defined as urban. Area A is a rural area of approximately 500 km^2 (55 km × 9 km). Two small towns (population ~15,000) are located in Area A and land cover and use are mainly agriculture/crop land and forests, and some residential and industrial areas. Area B is a rural area of approximately 105 km^2 (13 km × 8 km). One small town (population ~2000) is located in the eastern part of Area B and land cover and use are mostly agriculture/crop land and forests with few residential areas. Area C is designated as an urban area by the US Census. It has an area of approximately 120 km^2 (11 km × 11 km). A city (population ~40,000) is located in the area, and the population of the US Census Metropolitan Statistical Area including this city is approximately 300,000. Land use and cover are mostly urban residential, commercial, and industrial.

Area A individual sampling locations were approximately 3–4 km apart for the metals and 1–2 km for the toxicity analyses. Distances between sampling locations were variable in Area B due to primarily agricultural land use and lack of roads, which made some of the nodes on the sampling grid inaccessible; however, most sampling sites were approximately 1–2 km apart. Area C individual sampling locations were 1–2 km apart. Since not all sampling could occur at the exact grid node due to inaccessibility, the actual sampling locations were mapped using ArcGIS®, as were metal concentrations and MST values for each sample location.

For metal analysis, between 20 and 50 g of surface (upper 5 cm) soil were collected at each sample location. Leaf litter and other debris were removed before sampling. Samples were collected with sterile spatulas (Bel-Art, Pequannock, NJ, USA) and placed in sterile Whirl-Pak® bags (Nasco, Fort Atkinson, WI, USA). Samples were stored on ice and refrigerated upon return to the lab. Duplicate samples were collected at 10 % of sampling locations. A GPS unit (Garmin, Olathe, KS, USA) was used to record the exact latitude/longitude of the sampling location.

Within a week of soil collection, a portion of each soil sample was sent to Pace Analytical Laboratory (Huntersville, NC, USA) for sample digestion and analysis of As, Ba, Be, Cr, Cu, Pb, Mn, Ni (EPA method 3050) and Hg (EPA method 7471) with inductively coupled plasma-emission spectroscopy (ICP-ES). Soils collected from every other node throughout the entire area of Area A (60 of 119 soil samples) were analyzed for metals. All samples from Area B (114) and Area C (119) were analyzed for metals. Metal concentrations were reported in mg kg^{-1} dry weight (mg kg$^{\text{minus;1}}$ dw). Detection limits were ≤ 0.5 mg kg^{-1} dw for each metal, and any samples with concentrations below the detection limit were set to 0 for further analyses. Field duplicate and blank samples were sent to Pace Analytical and laboratory duplicate, blank, control, and matrix-spiked samples were analyzed by Pace Analytical for QA/QC.

A portion of each sample was also prepared for a general toxicity analysis using the Microtox® Toxicity System (Aelion and Davis, 2007) within three weeks of collection. Microtox® is a general toxicity test that uses a decrease in the luminescence of the bacterium *Vibrio fischeri* to calculate an effective concentrations (EC_{50}) at which luminescence is decreased by 50 %. All samples collected in each area were analyzed using Microtox®. For Area A, pH was not adjusted before Microtox® analysis. For Areas B and C, pH was adjusted to 6–7 by adding 7 g of soil to 35 mL Microtox® diluent (pH ≈ 7), mixing for 15 min with a magnetic stirring bar, measuring initial pH, and adding 5N sodium hydroxide (NaOH) until the desired pH range was reached. pH was measured with an Orion Ross pH probe (Thermo Scientific, Waltham, MA, USA) and calibrated based on the manufacturer's instructions. The initial and final soil pH values were recorded for these areas. After pH adjustment, Area B and C samples were analyzed using Microtox®. Because EC_{50} values (mg L^{-1}) are non-linear, they were log transformed and will henceforth be referred to as Microtox Soil Toxicity (MST) values. Due to the inverse nature of MST values, a lower number indicates higher toxicity, i.e., a lower concentration of the sample causes a 50 % reduction in luminescence.

To determine distances to industrial facilities from sampling locations, the latitudes and longitudes of facilities of interest were obtained from the US Environmental Protection Agency (EPA) Toxic Release Inventory (TRI) using 2005 data, which were the most recent data available when the study was conducted (EPA, 2008). Of 49 total facilities of interest, all except two were in existence from 1996–2001, during which data for MR/DD cluster identification were collected. Facilities had to meet three location criteria: be located in the county(s) in which the areas fell, be within at least 20 km of one sampling location, and be west of at least one sampling location, due to the west-to-east prevailing wind direction and weather patterns typically experienced in the area. The total numbers of TRI facilities identified for each area were 10 for Area A, two for Area B, and 37 for Area C. These facilities were mapped, and distances were calculated in km from each area-specific facility latitude/longitude coordinate to each sampling location latitude/longitude coordinate in that respective area using ArcGIS®. Therefore, there was a distance calculated to each facility attributed to each soil sample location. Information on facility on- and off-site releases for individual chemicals was also obtained from TRI reports.

Metal concentrations from Areas A, C, and pH-adjusted MST values from Areas B and C were compared by area using analysis of variance (ANOVA) in SAS® Version 9.1 (SAS Institute, 2002–2003); a p-value of ≤ 0.05 was used to determine significance. Pearson correlations were carried out for each area for all measured metal concentrations, MST values (Areas B and C only), and distances from facilities to sampling nodes using PROC CORR in SAS; a p-value of ≤ 0.05 was used to determine significance of the correlations.

Results

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Soil Metal Concentrations, Toxicity and Potential Sources

Beryllium concentrations were not significantly different between any of the areas (Table 1), and both Areas B and C had high percentages of non-detectable samples (98 % and 99 %, respectively) (data not shown). Metal concentrations of As, Ba, Cr, Cu, Pb, Mn and Ni were statistically greater in the urban MR/DD cluster Area C than the rural Areas A and B ($p<0.0001$). For Mn, Area A concentrations also were significantly greater than Area B concentrations ($p<0.0001$). Mercury concentrations were not significantly different between areas ($p=0.06$). For most metals, Area C had average concentrations at least three times higher than Area A concentrations and at least four times higher than Area B concentrations. Concentration and quartile ranges were also greater for Area C for most metals (Table 1). Area B had the highest percentages of samples below reportable concentration limits (except for Be and Hg) for all locations. Lead and Ba were detected in all samples of Areas A, B and C, and Cu, Cr and Mn were detected in all samples of Areas A and C; As was also detected in all samples of Area C (data not shown).

Table 1

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Table 1

Metal concentrations (mg kg^{-1} dry weight), Microtox Soil Toxicity (MST) values (mg L^{-1}) and soil pH for Areas A (n=60 for metals, 120 for MST), B (n=114), and C (n=119), EPA residential Preliminary Remediation Goals (R-PRG; mg kg^{-1}) and ANOVA p-values.

	Area A[a]			Area B			Area C			EPA R-PRG	ANOVA[c] p-value
	Conc. Range	Mean	Quartile Range[b]	Conc. Range	Mean	Quartile Range	Conc. Range	Mean	Quartile Range		
As	0–6.4	1.3	0.7–1.6	0–7.4	0.97	0–1.3	0.66–42.1	4.1	2.3–3.7	0.39	<0.0001*
Ba	2.1–210	20	7.3–23	1.8–35	13	7.1–18	8.4–328	73	31–89	5400	<0.0001*
Be	0–1.4	0.13	0–0.15	0–0.32	0.004	0–0	0–17.8	0.15	0–0	150	0.53
Cr	1–89	7	2.1–6.4	0–33	4.4	2.3–4.7	3.7–120	24	12–30	210	<0.0001*
Cu	0.45–23	3.2	1.2–3.5	0–52	3	0.86–2.8	3.1–204	17	8.6–19	3100	<0.0001*
Pb	2.1–53	12	5.1–14.3	1.6–140	17	6.9–19	2.4–288	45	15–55	400	<0.0001*
Mn	2.7–1600	86	10–62	0–120	22	6.1–25	32.7–1040	260	140–340	1800	<0.0001*
Ni	0–21	1.8	0.65–1.5	0–11	0.86	0–1.2	0–45.7	6.4	2.6–6.9	1600	<0.0001*
Hg	0–0.12	0.03	0.02–0.04	0–0.06	0.022	0.014–0.03	0–0.22	0.023	0–0.03	23	0.06
MST	NA[d]	NA	NA	3.8–5.59	4.66	4.41–4.88	3.89–5.28	4.56	4.34–4.79	NA	0.03*

	Area A[a]			Area B			Area C			EPA R-PRG	ANOVA[c] p-value
	Conc. Range	Mean	Quartile Range[b]	Conc. Range	Mean	Quartile Range	Conc. Range	Mean	Quartile Range		
Initial pH	NA	NA	NA	3.04–7.4	4.26	3.76–4.58	4.13–7.3	5.8	5.37–6.25	NA	<0.0001*

[a]Aelion et al. (2008);
[b]25th percentile to 75th percentile range;
[c]ANOVA comparisons of MST and pH for Areas B and C only;
[d]Not applicable;
*Denotes significant difference

Metal concentrations (mg kg^{-1} dry weight), Microtox Soil Toxicity (MST) values (mg L^{-1}) and soil pH for Areas A (n=60 for metals, 120 for MST), B (n=114), and C (n=119), EPA residential Preliminary Remediation Goals (R-PRG; mg kg^{-1} ...

Metal concentrations were compared to EPA Region 9 Preliminary Remediation Goals (PRG), which provide residential and industrial soil limits for inorganic and organic pollutants. Area A, B and C mean As concentrations were higher than the residential soil limit of 0.39 mg kg^{-1} (Table 1). The Area C mean was also three times higher than the industrial As limit (1.6 mg kg^{-1}; data not shown). For Areas A, B, and C, 82 %, 72 % and 100 % of samples, respectively, had As concentrations greater than the residential limit, and 30 %, 13 %, and 92 % had As concentrations greater than the industrial limit. No other metal concentrations from Areas A, B or C were above the PRG residential soil limits (Table 1).

Only soil from Areas B and C were pH adjusted for Microtox® toxicity measurements and therefore only these MST values were compared statistically. For Areas B and C, initial soil pH means were 4.3 and 5.8, respectively, and initial pH was significantly greater (more alkaline) for Area C than B ($p<0.0001$; Table 1). Area C had significantly lower MST (more toxic) values than Area B (Table 1).

A number of significant correlations ($p \leq 0.05$) between metals, and between MST values and individual metal concentrations was measured within each area. MST values were not included in the correlation analysis for Area A. Beryllium was not included in correlation analyses for Areas B and C due to the high numbers of samples with non-detectable concentrations. Therefore, there were 72 possible correlations between nine metals for Area A, and 72 possible correlations for Areas B and C for eight metals and MST values. Area A had 34, Area B had 23, and Area C had nine significant correlations between metals and MST values. Area A had the most significant correlations, with six metals (Ba, Be, Cu, Pb, Mn, and Ni) significantly correlated with all other metals (Figure 1). All metals were correlated with at least one other metal and the maximum correlation coefficients were 0.95 for Area A between Be and Ni, and 0.93 between Cu and Ni. For Area B, As and Pb concentrations were significantly correlated with all other metals (Figure 1). For Area B all metals were correlated with at least one other metal, and the maximum correlation coefficients were 0.57 between Ba and Mn, and 0.49 between Cu and Pb. Area C had the fewest significant correlations between metals and only Ba, Cr, Cu, Pb, Mn, and Ni concentrations were correlated with at least one metal (Figure 1). The maximum correlation coefficients were 0.77 between Cr and Ni, and 0.72 between Ba and Mn. Significant positive correlations between MST and Pb in Area A, and MST and Pb and MST and Mn in Area C are not included in Figure 1. MST values were significantly negatively correlated ($r = -0.2$) with Ni concentrations (increase in Ni concentration was associated with an increase in toxicity) in Area B, and with Cr concentrations in Area C ($r = -0.23$).

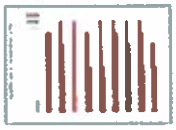

Figure 1

Number of significant correlations for metal concentrations and Microtox® Soil Toxicity (MST) values (by metal or MST) for Areas A, B and C. Nine metals were correlated in Area A, and 8 metals (no Be was measured) and MST values in Areas B and ...

Soil Metal Concentrations, Toxicity and Distances to TRI Facilities

In all areas, most of the TRI facilities investigated were manufacturing facilities. The distance to at least one facility was significantly correlated with at least one metal in each area, and with MST values in Area C only. In all cases, reported metals were negatively correlated with distance (as distance away from a facility increased, metal concentrations decreased), and MST values were positively correlated with distance (as distance away from a facility increased, MST increased which equates to a decrease in soil toxicity). In Area A, Cu concentrations were significantly correlated ($p \leq 0.05$) with distances to two facilities, one of which had self-

reported on- or off-site releases of Cu in 2005 (Table 2). For the one facility that released Cu, the EPA TRI reported 118 kg of Cu disposed of on-site (air and surface water) and ~34,500 kg transferred to an off-site landfill. In Area B, one facility distance was significantly correlated with concentrations of Ba, Mn, and Hg (Table 2). However, there were no documented on- or off-site releases of these metals from that facility in 2005. In Area C some facilities were located in the same general area and their locations overlap on Figure 2. Multiple crosses identify these locations. In Area C, 34 of 37 facility distances investigated were significantly correlated with either metal concentrations or MST values (Figure 2). Nineteen facility distances were correlated with MST values, and 29 were significantly correlated with Cr, three with Ba, three with Pb, one with Mn, and four with Ni concentrations (Table 2). Of these significant correlations, nine facilities had TRI-reported on- or off-site releases of the metals in 2005. Nine facilities released Cr and one of these also released Ni (Table 2). For Cr, maximum on-site releases to air and surface water were 45 kg, and maximum off-site releases to landfills, surface impoundments, and publicly-owned treatment works (POTW) were 4240 kg in 2005. For Ni, the facility released only 2.3 kg off-site in 2005. The facilities whose distances were significantly correlated with MST values released a variety of organic and inorganic compounds on- and off-site.

Figure 2
Locations of facilities (+) and soil samples (•) in Area C identifying approximate areas over which distance to facility and metal concentrations and Microtox® Soil Toxicity (MST) were correlated ($p \leq 0.05$) as determined using ...

Table 2
Numbers of significant correlations between individual metal concentrations and Microtox Soil Toxicity (MST) values, and distance to facilities for Areas A, B and C.

Of all metals measured, only As and Be concentrations were not significantly correlated with distances to facilities in Areas A, B and C (Table 2). Area C had the most facility distances correlated with metal concentrations and MST values, and there were notable groupings of correlated facilities to the west of the sampling locations, especially for Cr and Ni concentrations and MST values (Figure 2). MST values and Cr concentrations were correlated with distance to facilities over large spatial areas in Area C. In contrast, Ba, Pb, Mn, and Ni were correlated with distance to facilities over much smaller spatial areas. Manganese (data not shown) was correlated to the distance to one facility that was shared by Ba and Pb (Figure 2).

Discussion

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In this study we did not measure exposure of mothers or children to soils and metals due to confidentiality issues. Instead we measured concentrations of metals and soil toxicity over a uniform grid within identified areas. Of the three areas, the urban MR/DD cluster area (Area C), had the highest concentrations of most measured metals in surface soils compared to the rural MR/DD cluster area (Area B) and the reference area (Area A). Based on the pH-adjusted general soil toxicity indicator from Areas B and C, Area C also had more toxic soils than those collected from Area B.

In general, many of our urban Area C soils metal concentrations were similar to those measured in other urban areas with much greater populations and with more potential anthropogenic sources. Li et al. (2004) measured Cr, Cu, Ni, and Pb concentration ranges in urban Hong Kong top soil of approximately 8–92, 1–117, 5–40, and 12–360 mg kg^{-1}, respectively, which were similar to our Area C concentration ranges of the same metals. In urban parks in Seville, Spain, Madrid et al., (2002) measured average Cr, Cu, Pb, Mn, and Ni concentrations of 248, 5, 4, 10, and 42 mg kg^{-1}, respectively. Our mean Cu, Pb, and Mn concentrations for Area C were greater (17, 45, and 260 mg kg^{-1}, respectively), and our mean Area C Ni and Cr concentrations were lower than those

from Seville. Our urban area did not contain as large a city with respect to size and population as those investigated by Li et al. (2004) or Madrid et al. (2002), but it may be impacted by anthropogenic factors that are similar to those impacting other, more highly populated and urbanized locations.

Mercury, Pb and As have been more closely linked with MR/DD than the other metals measured in this study. The most important exposure to Hg is considered to be through the ingestion of contaminated fish (Järup, 2003). In the current study, Hg concentrations were low and fairly consistent among the three areas, and soil and associated dust may not be the most important exposure pathway. Lead is a known neurotoxin and blood Pb levels in children have been correlated with soil and dust Pb levels around the children's homes (Thornton et al. 1990), and with urban soils in New Orleans, LA, USA (Mielke et al. 2007). The main sources (leaded gasoline, paints, etc.) are more numerous in urban areas than rural areas. Lead concentrations were three to four times higher in Area C than in Areas A and B. Arsenic has been shown to impact neurological functioning due to ingestion of contaminated water (Wasserman et al., 2004), and As exposure also has been documented in humans from highly contaminated soils (Hinwood et al., 2004; Carrizales et al., 2006); however, soil As concentrations in these studies averaged 120 and 790 mg kg^{-1}, respectively, much higher than As concentrations we measured. Arsenic was present in all samples from Area C and As concentrations were three to four times greater in Area C than the other two areas. All As concentrations measured in Area C and most from Areas A and B were greater than EPA PRG residential soil limit.

Contaminant sources, whether anthropogenic or natural, are important to quantify in order to establish preventive measures to reduce exposure. Correlations between metals can indicate commonalties of source. Areas A and B had many more significant correlations between metals than Area C, and all metals were correlated with at least one other metal in Areas A and B, suggesting potential similar sources for these metals. Area C had fewer significant correlations between metals which may indicate more potential metal sources in this urban area. Based on cluster analysis, Chen et al. (1997) found that urban and orchard soils were more heavily polluted by As, Cu, Pb, and Zn than other soils indicating commonality of agricultural sources. Wong et al. (2002) observed a large number of significant correlations between metal concentrations in high density agricultural soils in China, and concluded that the source of Cu, Cr and Zn was geochemical and not anthropogenic. While correlations may indicate similar sources of metals and point to natural occurrence or anthropogenic input, additional research would be required to determine actual sources of metals in each area.

Industrial facilities may impact soil concentrations, as was found by Douay et al. (2007), who identified a significant relation for cadmium (Cd) concentrations and distance (within ~1–2 km) of a former Zn smelter site, a highly significant point source of Cd, in Northern France. The current study examined larger spatial distances and included many facilities with self-reported on- and off-site releases of several chemicals; it did not focus on identifying one large point-source facility. Of the 10 facilities examined in Area A, distances to only two were marginally significantly correlated to soil Cu concentrations and only one facility had documented on and off-site releases of Cu. Only two facilities were examined in Area B, and neither had TRI-reported releases of Ba, Mn or Hg, the three metals to which distances from the facilities were correlated. Area B also had no significant correlations between facility distances and MST values. In general, metal concentrations in soils from Areas A and B were not strongly associated with distance to facilities. These rural areas may not have a sufficient number of facilities to measure associations between metals and facility distance over large spatial areas. The causes for the identified MR/DD cluster do not appear to be associated with soil metals or soil toxicity in Area B.

For Area C, distances to facilities were significantly correlated with metals for which the facilities had self-reported on- or off-site releases in 2005, and for the 10 year period preceding 2005. Within Area C, Ba, Pb and Mn were correlated with distance to facilities over small spatial distances (< 5 km). However, there are no known industrial releases of Ba, Pb, and Mn within the Area. Barium and Mn are expected to occur naturally and associations to industrial facilities are not expected. Nickel also was correlated with distance to facilities

over small spatial distances (< 5 km), and the distance to one facility releasing Ni was significantly correlated to concentrations of this metal in soils in Area C.

In Area C, distances to nine facilities releasing Cr were significantly correlated with measured Cr concentrations in soils, indicating potential industrial Cr sources. Chromium was correlated over large spatial scales (>20 km) as was the general soil toxicity indicator (MST), whose correlations to facility distance overlapped geographically with Cr concentration associations. Area C had significantly lower pH-adjusted MST values (more toxic) than Area B. For Area C, 19 facility distances (all of which were located to the west of sampling locations) were correlated with MST values. A variety of chemicals may be released from the facilities, any of which may drive soil toxicity alone or synergistically. Although MST values were not highly correlated with metal concentrations, soil toxicity was correlated with Cr in Area C. It appears that for Area C, soils of high metal concentration and toxicity exist and have associations with distance to facilities. While the majority of metals were disposed of off-site for facilities whose distances were significantly correlated with metals, the potential for contamination due to waste production at these sites cannot be discounted.

Significant correlations of metal concentrations to distance to facilities do not indicate that these facilities are responsible for soil metal concentrations, nor that they have an impact on negative human health outcomes. The significant relation is with the facility distance, not the facility itself. Also at all our sites, As concentrations were greater than the PRG residential limit at many sampling locations and thus are at higher concentrations than is desirable in residential soils. Facility distances were not significantly correlated with As and few of the facilities investigated produced As; this suggests a different anthropogenic (e.g., agricultural) or natural source of As.

Clusters of MR/DD occur in both rural and urban areas; however, due to the small number of births in rural areas, not only are these clusters more difficult to identify, but environmental associations also may be more difficult to detect. In the rural cluster area (Area B), the number of cases was small (4 cases of MR, 91 cases of DD and 181 total children) and the cluster was identified based on the preponderance of DD diagnoses, an outcome that is less well-defined than MR. It is possible that the rural Area B had an over-diagnosis of DD or a localized cluster with no environmental component. It also is possible that the relevant anthropogenic or natural contaminants were not measured, or that the sampling grid was not on an appropriate spatial scale to capture environmental components at this location.

Fifty percent of MR cases have unknown causes (McDermott et al., 2007) and environmental conditions may be a contributing factor to these cases. In order to determine whether any metals or soil toxicity contribute directly to human exposure and MR/DD, additional studies would be needed to quantify actual human exposures and uptake of suspect chemicals, as was done by Mielke et al. (2007). Similarly, to determine if a specific facility is imparting metals and toxicity to surrounding soils, sampling would be required at that individual facility. However, the focus of this study was not to identify individual facilities, but rather to identify whether, on a large scale, distances to facilities were associated with metal concentrations and soil toxicity in residential soils in areas with a known negative childhood health outcome based on maternal residency during pregnancy. Based on the sampling grid used, and measurements of specific metal concentrations and general soil toxicity values, it appears the association can be made in the urban area, but not in the rural area studied.

Acknowledgments

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Footnotes

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Soil Facts

Minimizing Risks of Soil Contaminants in Urban Gardens

Gardening in urban areas is increasingly popular in North Carolina. Growing food locally (which requires less energy for packaging, transit, and storage), connecting to nature at your doorstep, engaging children in agriculture, and controlling the amount and types of pesticides and fertilizers applied to your food are among the many wonderful reasons to garden in the city. But urban gardening poses potential risks. Before planting, city gardeners must evaluate how a prospective site was previously used, to identify potential safety hazards—including chemical contaminants—in the soil.

This publication alerts prospective gardeners to some of the most common contaminants in urban soils, such as lead and other toxic metals, solvents, pesticides, and total petroleum hydrocarbons. Readers will learn how to minimize potential risks to gardeners and to those who consume garden produce. The document includes information regarding site characterization, common contaminants, soil testing, interpretation of results, and strategies for reducing exposure risks.

To ensure quality site assessment and analyses, it may be necessary to engage trained professionals. Links to certified professional soil scientists, environmental consultants, and laboratories are provided.

Exposure routes to soil contaminants from urban gardens

Gardeners, garden visitors, neighbors, and animals (including pets, wildlife, and aquatic organisms) can each be exposed to soil contaminants in a variety of ways including:

- Eating soil (including soil adhering to fruits and vegetables)
- Breathing volatiles and dusts
- Absorbing contaminants through skin
- Eating fruits and vegetables that have absorbed contaminants

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Specific exposure routes to contaminants in soils vary based on the particular contaminant, site characteristics, and management practices.

Site characteristics that indicate potential soil contamination

Take a careful look at the history of land use before selecting a site to garden. Evaluate not only the actual plot to be developed but the surrounding lots as well. Start with city records available online or at city hall. They will help you identify the property class, zoning information, and current and previous owners. Long-time neighbors can be valuable sources of information. If the history is questionable, check with local and state agencies to see if an environmental evaluation has been conducted or if the property is listed in the N.C. Department of Environment and Natural Resources Division of Waste Management Brownfields Program Map Viewer (http://portal.ncdenr.org/web/wm/bf/map).

Sites of special concern include those currently or formerly associated with land uses as described below and in Table 1.

- Manufacturing and industrial sites, abandoned railroad lots, dry cleaners, and gas stations may have risks associated with chemical storage, leakage, and discharge into the environment.
- Landfills, junkyards, and waste disposal sites may have inorganic and organic contaminants that have leached into soils.
- Highway corridors, parking lots, or heavily trafficked areas are commonly associated with high lead levels from vehicle emissions.
- Household sites may have substantial lead deposits from older paints and plumbing fixtures.
- Former farmland may have built-up concentrations of inorganic and organic contaminants from fertilizers and pesticides due to excessive application or spills in storage and mixing areas. Otherwise, cropland acreage is generally immediately suitable for gardening applications.

Testing the soil

Documenting the actual site contaminant levels requires appropriate soil sampling, laboratory analysis, and data interpretation. It may be difficult to adequately

Table 1. Potential Issues Associated with Different Previous Land Uses

	Potential Problems					
Type of Site	Lead	Other Inorganic Pollutants[1]	Organic Pollutants[2]	Compacted Soil	No Topsoil	Glass, Misc. Litter
Near coal-fired plant		X				
Highway corridor	X	X				
House demolition	X	X		X	X	X
Industrial site	X	X	X	X	X	X
Parking lot	X	X		X	X	X
Farmland[3]		X	X	X		
Storage lot[4]	X	X	X	X	X	X
Vacant urban lot[4]						X

[1] Different metals are likely to result from specific activities or sources, i.e. paint, galvanized metal, pesticides, wood preservatives, etc. Inorganic pollutants like nitrates and trace elements are naturally found in the environment, but in urban areas they may be concentrated to unsafe levels. Examples include arsenic, barium, cadmium, chromium, lead, mercury, and zinc.

[2] Organic pollutants, including petroleum hydrocarbons, pesticides, solvents, and pharmaceuticals are likely to result from specific activities or sources, i.e. fuel storage, cleaning fluids, etc.

[3] Crop fields generally have few limitations, but storage, loading, and mixing areas may have problems similar to non-agricultural industrial sites and storage or parking lots. Some older fields and orchards may have been treated with arsenic pesticides.

[4] Check how long the lot has been vacant, what its prior uses were, and what has been stored there (for example, road salts).

Note: Sites are highly variable and need to be evaluated on an individual basis. A thorough site analysis is required to determine appropriate soil sampling positions, depths, methods, and analytical needs

Special Concerns for Children

Children are a target audience for many community gardens, but they are also more vulnerable to contaminants for several reasons:

- They love playing in the dirt.
- When they put fingers, sticks, or even soil in their mouths, they directly consume more soil contaminants.
- Being closer to the ground means they inhale more dust and volatile compounds in the soil.
- Their bodies are rapidly growing and developing, so they have lower tolerances for many contaminants.

characterize a site without hiring a consultant to direct the process. Sources for certified professional consultants who can help assess soil contaminant levels are provided at the end of this document.

Tables 1 and 2 will help you select the appropriate laboratory analyses by identifying which contaminants may be present in the soil and thus which tests are needed.

- **If there are no contaminant issues and soil sampling is for routine liming and soil fertility assessment only,** North Carolina soil samples can be submitted to the NCDA&CS Agronomic Division laboratory for analysis and recommendations. This routine analysis includes copper and zinc, as they are also plant nutrients. The lab is capable of analyzing for other heavy metals but provides this service only to state-regulated sites.
- **If inorganic contaminants** are suspected, a typical analysis may also determine the levels of lead, zinc, mercury, cadmium, arsenic, barium, chromium, and selenium.
- **If organic contaminants** are suspected, analyses could determine levels of total petroleum hydrocarbons (TPH)—particularly polycyclic aromatic hydrocarbons (PAH)—solvents such as trichloroethylene and perchloroethylene (TCE, PCE/PERC), pesticides (e.g. atrazine, carbaryl), dioxin, and bisphenol A(BPA).

Select and contact a soils lab ahead of time to identify fees and get specific directions on how samples should be collected and submitted. See the link to North Carolina Soils Labs at the end of this publication. For general directions on how to collect a soil sample, see *A Gardener's Guide to Soil Testing*, http://www.cals.ncsu.edu/agcomm/publications/Ag-614.pdf.

Interpreting the results of the soil test

Some contaminants occur naturally in the soil, while others are introduced by humans. The trace elements most frequently found at unsafe levels in urban soils are lead, arsenic, cadmium,

Table 2. Common Sources of Contamination

Source	Contaminant(s)
Burning wastes	Dioxins, PAHs[1]
Coal ash	Arsenic, cadmium, lead, mercury, selenium, other trace elements
Commercial/industrial Site	Lead, other trace elements, PAHs, petroleum products, solvents
High traffic areas	Lead, PAHs, zinc
Manure, dairy lots	Copper, zinc
Paint (prior to1978)	Lead, barium, mercury
Pesticides	Arsenic, chlordane and other chlorinated pesticides, lead, mercury (historical use)
Petroleum spills/emissions	Benzene, lead, PAHs, toluene, xylene
Plumbing fixtures	Lead
Sewage sludge	Cadmium, lead, POPs[2], zinc
Treated lumber (prior to 2002)	Arsenic, chromium

[1] PAHs = polycyclic aromatic hydrocarbons

[2] POPs = persistent organic pollutants, a generalized grouping of organic compounds resistant to environmental degradation.

Table 3a. Median Soil Concentrations, Thresholds for Concern, and Management Recommendations for Selected Trace Elements in Urban Soils

Trace Elements					
Contaminant Chemical (abbrev.)		Median and Range of Soil Concentrations (mg/kg)[1]	Remediation Goal (mg/kg)[2]	Common Sources	Management Notes
Arsenic	(As)	7.2; <0.1–97	4.4	Lumber treated prior to 2003; pesticides; manure; coal ash	High concentrations, above remediation goals, found naturally
Barium	(Ba)	580; 10–5,000	3000	Paint, brick, glass, tile production, medical diagnostics	Less plant uptake at high pH (>6.5)
Cadmium	(Cd)	0.35; 0.01–2	14	Biosolids; phosphate fertilizers; coal burning	Less plant uptake at high pH (>6.5)
Chromium	(Cr)	54; 1–2000	24000 (Cr[III]); 0.29 (Cr[IV])[3]	Wood preservatives; consumer products	
Lead	(Pb)	19; <10–700	0.0012–400[3]	Formerly used in gasoline, paint, and plumbing fixtures; gasoline emissions; paint chips; used batteries; biosolids; coal ash	Less plant uptake at high pH (>6.5)
Mercury	(Hg)	0.09; <0.01–4.6	0.98–4.7[3]	Paint; fungicides; coal-fired power plant emissions; used batteries	
Selenium	(Se)	0.39; <0.1–4.3	7.8	Coal ash	
Zinc	(Zn)	60; <5–2900	4.6–4600[3]	Biosolids; manure	Less plant uptake at high pH (>6.5)

Note. Only *select* contaminant elements are included. Selection of contaminants for testing should be determined based on site history. It is likely that all contaminants listed in Tables 3a and 3b need not be analyzed, but it is also possible that additional contaminants not included here should be investigated.

[1] Sparks, DL. 2003. *Environmental Soil Chemistry*. Academic Press, San Diego, CA.

[2] NC Department of Environment and Natural Resources Inactive Hazardous Sites Branch Soil Remediation Goals (SRG) Table: http://portal.ncdenr.org/c/document_library/get_file?uuid=5539ecfb-739f-4345-9459-b514508135f1&groupId=38361

[3] Soil remediation goal dependent on species or form of contaminant.

chromium, barium, and mercury. PAHs are the biggest concern among organic contaminants. Human activity in urban centers tends to increase the levels of contaminants in the soil. In addition, metals introduced by humans tend to be more readily available and easily absorbed into living systems. At low levels, contaminants may pose no known health risk, but higher levels may lead to acute or chronic health problems. The level considered safe varies by contaminant and by site characteristics. Additionally, individual contaminants may be present in a variety of chemical forms or species, each of which may constitute a different level of risk. A qualified consultant may be useful in determining acceptable levels for a specific site.

Laboratory reports can be read and interpreted by comparing with published U.S. EPA and North Carolina Department of Environment and Natural Resources guidelines in Tables 3a and 3b. It must be verified that the laboratory is using EPA guidelines or a specific method and type of analysis (extraction) for comparison with published levels.

Keeping Risk in Perspective

It is important to identify and minimize potential risks from soil contaminants, but it is also useful to keep the level of risk in perspective. Smoking 1.4 cigarettes or eating 100 grilled steaks presents the same health risk as a lifetime of exposure to PAHs in soils at the recommended clean-up level (Folstad et al., 2011). Moreover, high concentrations of arsenic and other metals can be found in natural, non-polluted soils, often even above remediation goal levels.

Table 3b. Median Soil Concentrations, Thresholds for Concern, and Management Recommendations for Selected Organic Contaminants in Urban Soils

Organic Contaminants			
Contaminant Chemical (abbrev.)	**Remediation Goal (mg/kg)[1]**	**Common Sources**	**Management Notes**
Atrazine	2.1	Pesticide	Degrades quickly—half-life of 60–100 days
Benzene	1.1	Petroleum	Degrades quickly—presence indicates new spill
Benzopyrene	.015	Vehicle emissions	Common PAH
Carbaryl	1200	Pesticide	Degrades quickly—half-life of 7–28 days
Chlordane (and other chlorinated pesticides)	1.6	Termite control pesticides	
Dioxin (PCDD)	.0000045–.000094[2]	Chemical production; incinerators; smelters; fires and lightning; cement kiln dust	
Polycyclic Aromatic Hydrocarbons (PAH)	.0018–3400[2]	Vehicle emissions; coal tars; asphalt; fires and lightning	The most common contaminants. Used to produce plastics, pesticides, and a myriad of other consumer products. Highest concentrations near roadways.
Tetrachloroethylene, perchloroethylene (PERC, PCE)	0.55	Dry-cleaning product; chemical production; industrial solvents	
Polychlorinated biphenyl (PCB)	1	Coolants; electronics	
Toluene	820	Petroleum; furniture refinishing	Degrades quickly—presence indicates new spill
Trichloroethylene (TCE)	2.8	Industrial solvents; chemical production	
Xylene	130	Petroleum	Degrades quickly—presence indicates new spill

Note: Only *select* contaminants are included. Selection of contaminants for testing should be determined based on site history. It is likely that all contaminants listed in Tables 3a and 3b need not be analyzed, but it is also possible that additional contaminants not included here should be investigated

[1] NC Department of Environment and Natural Resources Inactive Hazardous Sites Branch Soil Remediation Goals (SRG) Table: http://portal.ncdenr.org/c/document_library/get_file?uuid=5539ecfb-739f-4345-9459-b514508135f1&groupId=383613.

[2] Soil remediation goal dependent on species or form of contaminant.

Strategies for reducing exposure risks

If your analysis reports levels lower than those in Tables 3a and 3b, gardening at that site presents minimal risks. If your soil's levels exceed those in the chart, you should either choose a different site or take precautions to protect gardeners, neighbors, and those who consume produce from the garden. If you decide to garden on the site, use some of the strategies in Table 4 to minimize physical contact with contaminated soil and plant uptake of contaminants. These strategies will help prevent toxins from being absorbed through the skin, breathed in as dust, or consumed.

Lead Contamination in Urban Soils

Lead is the most common contaminant in urban soils, and intake of contaminated soil—through direct ingestion, dust inhalation, or exposure to soil clinging to produce—may pose a serious health risk. Young children and pregnant women are at the greatest risk from lead contamination, as high lead exposure may result in behavioral and learning disabilities. Lead may be derived from a number of pervasive sources, including gasoline emissions, paint chips from older buildings, plumbing pipes, and industrial processes. Lead accumulates where it is deposited and is not easily removed from soil.

Soil testing for lead is essential prior to gardening in an urban setting, and if high levels are found, steps must be taken to minimize lead exposure and prevent health risks.

Table 4. Strategies for Reducing Risk of Exposure to Soil Contaminants

Personal Hygiene • Wear gloves and wash your hands well after working in the garden. • Remove shoes outside to avoid tracking soil into the house. • Prevent children from ingesting soil.	
Food Safety • Remove outer leaves of leafy crops, and wash all produce with a mild detergent to remove dirt and dust. • Peel root crops. • Conduct plant tissue testing to assess the level of contaminants actually in the produce.	
Garden Design • If the contamination is limited to part of the garden, consider modifying the layout to avoid areas with excessive contaminants. Plant those areas with perennial ornamentals to minimize soil disturbance. • When possible, locate gardens away from buildings and heavily traveled roads. • Install raised beds with imported healthy soil. Be sure to allow drainage, but seal off the bottom of the bed so that roots do not penetrate contaminated soil.	
Plant Selection • The edible parts of root crops (carrot, potato, beet, onion) are in direct contact with the soil, so avoid planting these in riskier sites. Peeling reduces some risk. • Shoot and leaf crops (celery, lettuce, broccoli, cabbage) represent an intermediate level of risk. • Fruit-bearing crops (tomato, cucumber, bean, pea) will have lower contaminant concentrations.	
Soil Management • Apply lime based on soil-test recommendations to avoid excess acidity. Some contaminants move more readily into the plant when the pH is low. • Organic matter often binds and renders some contaminants unavailable for plant uptake. Amending soils with good-quality compost may help lower the risk of some contaminants and improve overall soil fertility and physical properties. • If necessary, soil may be decontaminated by physical (excavation, washing, vapor extraction) or biochemical (microbial degradation, phytoremediation) techniques. Consult a professional to determine the optimal remediation strategy appropriate to your site.	

Sources for certified soils professional consulting, sampling, and analyses

Inclusion here does not imply endorsement of any specific service or suggest that alternatives not mentioned are unsuitable.

• Active Licensed Soil Scientists in North Carolina, with designation of area of state providing consultation: http://www.ncblss.org/director.html

• Soil Testing Companies in North Carolina: http://www.manta.com/mb_45_A62DE7N9_34/soil_analysis/north_carolina

• Better Business Bureau Accredited Businesses: http://www.bbb.org/us/bbb-accredited-businesses. Search for "Environmental Consultants," "Testing Labs" and "Soil Testing Companies" by city or zip code.

Additional information

Your local Cooperative Extension Service center is a valuable source of information on lawn and garden care (http://www.ces.ncsu.edu/).

Careful Soil Sampling: http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-30/

North Carolina Department of Agriculture and Consumer Services, Agronomic Division, Soil Testing Laboratory: http://www.ncagr.gov/agronomi/sthome.htm

A Gardener's Guide to Soil Testing: http://www.cals.ncsu.edu/agcomm/publications/Ag-614.pdf

US EPA Soil Screening Guidance: User's Guide. 1996, Publication 9355.4-23. http://www.epa.gov/superfund/health/conmedia/soil/index.htm
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/chemicals/SSG_nonrad_user.pdf
See p. 67 diagram for exposure pathways.

US EPA Urban Agriculture & Improving Local, Sustainable Food Systems: http://www.epa.gov/brownfields/urbanag/index.html

NC STATE UNIVERSITY

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UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

INTERPRETING THE RESULTS OF SOIL TESTS FOR HEAVY METALS

Vern Grubinger and Don Ross, University of Vermont

Agricultural soils normally contain low background levels of heavy metals. Contamination from industrial activities or byproducts can increase the natural levels of heavy metals in soil, creating a health hazard to people, livestock and plants. Fertilizers and other soil amendments also add small amounts of heavy metals to the soil, which can build up over time with repeated applications.

The actual toxicity of a heavy metal will be affected by soil texture, organic matter, and pH. The health effects of exposure to heavy metals depend on the amount and duration of exposure, i.e. the volume of contaminated soil or food consumed over time.

It is not clear exactly what levels of heavy metals in soil are safe or unsafe, so the following information is provided only to help you understand your test results and the relative level of risk they represent. In soils with elevated heavy metal levels, which may pose higher levels of risk, you should consider whether remedial actions are appropriate, or whether crops should be grown at all.

UVM Heavy Metals Soil Test

The test provided by UVM is only a screen for heavy metals and does not measure the actual total metal content of the soil. This low-cost test uses a weak acid to extract heavy metals. The amount of metal extracted is roughly proportional to the total amount present. Maximum levels for heavy metals in soils established by regulatory agencies are based on total heavy metal content (see below) and require a more involved and expensive test. If your UVM test results indicate an elevated level of heavy metal(s), well above the median levels in Table 1 you should consider submitting another sample for a total heavy metal analysis.

Table 1 shows the aggregated results of thousands of UVM heavy metal soil tests from across many soil types and management practices on farms and gardens in Vermont. The table includes the median result for each element, which is the point where half the test results were above and half the test results were below. The 95% and 99% result levels are the points where only 5% and 1% of all test results, respectively, were higher. The maximum level is the highest test result recorded for that element from the number of tests shown in the bottom row. Test results above the 95% level may be cause for concern, and thus some remedial action (see below). An extremely high level may be cause for extreme action, such as abandonment of production, but such results are rare, as indicated by the fact that the maximum levels found for each element are many times higher than the 99% level for each element. (All results are mg/kg of soil, which is the same as ppm.)

Table 1. Combined results of field, horticulture and homeowner soil tests for heavy metals. University of Vermont Agricultural and Environmental Testing Lab, 2007-2011. Results are for extracted heavy metals using pH 4.8 ammonium acetate. (Arsenic is not listed because it is not effectively extracted.)

mg/kg of soil	Copper	Cadmium	Chromium	Nickel	Lead	Zinc
Median	0.20	0.05	0.05	0.15	0.35	1.05
95%*	0.75	0.10	0.15	0.50	2.20	6.90
99%**	1.75	0.20	0.20	1.20	18.30	24.30
Maximum	60.50	2.25	1.05	11.65	2129.00	370.50
Number of tests	17,209	11,958	11,638	12,252	17,183	17,302

* 5% of all test results were higher than this level. **1% of all test results were higher than this level.

Interpreting TOTAL Heavy Metals Soil Test Results

The US Environmental Protection Agency (EPA) and NY Department of Environmental Conservation (NYS DEC) have guidelines for determining the safety of various land uses based on total soil metal concentrations. Table 2 shows these limits, which are used to guide clean-up efforts. EPA levels are used to guide clean-up efforts of contaminated sites; NYS DEC levels are based on removing human health risks; unrestricted use includes agriculture.

Table 2. Levels of heavy metals in soil used to guide cleanup and land use decisions (mg/kg)

	US EPA	NYS DEC	
	Soil level requiring clean-up	Unrestricted use*	Residential use
Copper (Cu)	--	270	270
Cadmium (Cd)	70	0.43	0.86
Chromium (Cr)	230	11	22
Nickel (Ni)	1600	72	140
Lead (Pb)	400	200	400
Zinc (Zn)	23,600	1100	2200

*Includes agricultural use.

Lead is a Special Concern

There has been a lot of attention paid to lead levels in soil because it is well-known to cause adverse health effects, and is relatively widespread as a result of its historical use in many commercial products, from gasoline to paint. Table 3 shows the guidelines for garden soil use based on total lead content that have been developed by the states of New Jersey and Pennsylvania.

Table 3. Soil lead contamination levels and recommended actions.

Contamination level	Total Lead in soil mg/kg		Recommended Action
	PA	NJ	
none / very low	< 150	< 100	No need to be concerned about lead exposure.
low / elevated	150 - 400	100 - 300	Conduct best management practices (BMPs) to minimize lead exposure from vegetable gardens: apply phosphate fertilizer, maintain high pH for fruiting vegetables, keep soil mulched to minimize dust and lead inhalation.
medium / significant	400 - 1000	300 - 400	Conduct BMPs; do not grow leafy vegetables.
high / cleanup	> 1000	> 400	Do not grow a vegetable garden. Contact local health department for lead abatement measures.

Best Management Practices for Soils with Elevated Levels of Heavy Metals

Although heavy metals remain in soil for a very long time, there are some steps that can be taken to reduce the level of risk they pose. In some cases, heavy metal concentrations can be 'diluted' with deep tillage; for example, to distribute contaminated surface sediment that was deposited by flooding. In garden plots, dilution can be achieved by the addition of uncontaminated soil. Adding organic matter to the soil can help 'tie up' heavy metals chemically, reducing their availability for potential plant uptake. Similarly, liming to a neutral pH and maintaining optimal soil phosphorus levels can reduce heavy metal availability to plants. For some heavy metals, such as lead, there is little evidence that it is accumulated within crops; the main health hazard is through soil ingestion and inhalation. Soils high in heavy metals pose a greater health risk to children than to adults because children are still growing, and they are more likely to ingest soil directly.

To reduce health risks in soils with elevated heavy metal content, food crops should be thoroughly washed to remove as much soil as possible. Outer leaves of leafy greens should be removed and root crops should be peeled to further reduce risk.

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The information in this document reflects our best effort to interpret regulatory guidelines and scientific research, and to translate this into practical management options. However, growers are fully responsible for their own management decisions, for the quality of the food they sell, and for compliance with all applicable laws and regulations.

September 22, 2000

OFFICE OF WASTE MANAGEMENT

Policy Memo 00-01

GUIDANCE FOR ARSENIC IN SOIL

1.0 PURPOSE

This policy establishes an approach for determining soil remedial objectives for arsenic at sites regulated under the Rhode Island Departmental of Environmental Management (the Department) Office of Waste Management. The policy is being adopted to alleviate difficulties encountered at sites at which the concentrations of arsenic exceed existing Method 1 Residential or Industrial/Commercial Direct Exposure Criteria, and to facilitate acceptable and timely advancement of contaminated sites through the site remediation process. This policy is developed under the authority of Rhode Island General Laws, Chapters (as applicable) and shall be construed to be consistent with the *Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases* (March 1993, amended August 1996) (short title, "Remediation Regulations").

2.0 BACKGROUND

Arsenic is a naturally-occurring element; the 20th most abundant element in the earth's crust. Arsenic is usually found in the environment combined with other elements, such as oxygen, chlorine and sulfur, or in organic form. Inorganic arsenic occurs naturally in many kinds of rock, especially ores that contain copper, lead, iron, nickel, and other metals. Studies of background levels of metals in Rhode Island soils have identified that the mean arsenic soil concentrations in Rhode Island appeared lower than the national average, as discussed in Section 3.0. Further, RI's concentration of arsenic is lower than certain other New England States due to the fact the State of RI is not part of the Connecticut River Valley geological formation. The Connecticut River Valley geological formation has elevated levels of arsenic. The State of RI is part of the New England Coastal geological formation, which has lower levels of arsenic.

In additional to its natural occurrence in soils, arsenic has also historically been used in a variety of commercial applications. The principal (74%) use of arsenic is as a component of a wood preservative. Most of the remaining use (19%) is in the production of agricultural chemicals, such as insecticides, herbicides, algaecides, and growth stimulants. Smaller amounts have been used in the production of glass, nonferrous alloys, in the electronics industry and in medicine.

The U.S. Environmental Protection Agency (US EPA), the International Agency for Research on Cancer (IARC), and the National Toxicology Program (NTP) classify arsenic as a human carcinogen. Epidemiological studies have shown that inhalation exposure to inorganic arsenic

increases the risk of a variety of forms of lung cancer. Most of these studies involved worker exposure to arsenic trioxide dust at copper smelters or arsenate at chemical plants. Epidemiological studies have also shown that ingestion of inorganic arsenic increases the risk of developing skin cancer, most commonly squamous and basal cell carcinomas. In addition, evidence exists that ingestion of arsenic may also increase the risk of certain internal cancers, including tumors of the bladder, kidney, and liver.

For these reasons, the US EPA regulates arsenic as a carcinogen and has developed a variety of toxicity values for use in setting remedial objectives for arsenic. While the US EPA has not established a national regulation regarding arsenic in soil, its generic soil screening level (SSL) for arsenic in soil is 0.4 mg/kg, corresponding to a cancer risk level of one-in-one-million (denoted $1x10^{-6}$) for exposure through soil ingestion (US EPA, 1996).

3.0 THE REMEDIATION REGULATION'S ARSENIC STANDARDS

Methods for establishing remedial objectives for hazardous substances in the State of Rhode Island are specified in the Remediation Regulations. According to Rule 8.01 of the Remediation Regulations, five regulatory requirements must be met when establishing remedial objectives for a hazardous substance. These requirements are as follows:

- The remedial objective for a carcinogenic substance does not exceed a $1x10^{-6}$ excess lifetime cancer risk and the cumulative excess cancer risk posed by the contaminated-site does not exceed $1x10^{-5}$;
- The remedial objective for each non-carcinogenic substance does not exceed a hazard index of 1, and the cumulative hazard index posed by the contaminated-site does not exceed 1 for any target organ;
- The remedial objective will not significantly contribute to adverse effects to any environmentally sensitive areas at or in the vicinity of the contaminated-site;
- The remedial objective will be protective of the natural resources of the State, including but not limited to groundwater; and
- The remedial objective shall address the requirements of Rule 8.07 (Upper Concentration Limits)

Rule 8.01 also states that "Concentration-based soil and groundwater objectives may consider background conditions".

The Remediation Regulations establish default or Method 1 remedial objectives in soil and groundwater for a select group of substances. Soil remedial objectives are developed for Direct Exposure, Leachability, and Upper Concentration Limits. The Method 1 soil remedial objectives established for arsenic in the Remediation Regulations are shown below:

Land Use	Direct Exposure Criterion (mg/kg)	Upper Concentration Limit (mg/kg)
Residential	1.7	10,000
Industrial/Commercial	3.8	10,000

The Remediation Regulations have not established Groundwater Objectives or Leachability Criteria for arsenic.

The Method 1 Residential Direct Exposure Criterion for arsenic of 1.7 mg/kg is not a risk-based value, but was adopted from a state-wide study of background arsenic concentrations summarized in a document entitled *Background Levels of Priority Pollutant Metals in Rhode Island Soils* (RIDEM, undated). Background, as defined in Rule 3.05 of the Remediation Regulations, shall mean the ambient concentration of hazardous substances present in the environment that have not been influenced by human activities, or the ambient concentrations of hazardous substances consistently present in the environment in the vicinity of the site which are the result of human activities unrelated to releases at the contaminated site.

In the background study, a statewide geometric mean arsenic concentration of 1.67 mg/kg was calculated from 105 samples collected throughout the State. A risk-based soil objective for arsenic, based on its potential carcinogenic effects and default residential exposure assumptions specified in the Remediation Regulations, is 0.4 mg/kg. Because the risk-based value is below the State geometric mean background concentration, the mean background concentration (rounded to 1.7 mg/kg) was promulgated as the Method 1 Residential Direct Exposure Criterion. The lifetime incremental cancer risk value associated with this criterion is four-in-one-million ($4x10^{-6}$).

4.0 STATEMENT OF PROBLEM

Since implementation of the Remediation Regulations, arsenic in soil has been detected at investigated sites at concentrations above the Method 1 Residential and Industrial/Commercial Direct Exposure Criteria. At these sites, the Department would require site-specific background determinations to be performed to determine that there has been no release of arsenic. In the past, these comprehensive background investigations have been required without consideration either to the magnitude of exceedences of the criteria or to site specific factors. As a result, at many sites it has been both cost- and time-prohibitive to determine that the arsenic present at the site is consistent with background levels and not the result of a release of arsenic.

5.0 SOLUTION METHODOLOGY

The Department has evaluated two background arsenic studies for soil samples collected within the boundaries of the State. The results of the first study, which was based upon 105 samples,

indicated that the mean background concentration of arsenic in the State was 1.67 ppm. This arsenic concentration is based on data points extracted from Department site files that constitute the full inventory of sites. A second study (pending publication) conducted after the finalization of the Remediation Regulations evaluated 338 samples and confirmed the findings of the first study.

The Department recognizes that background concentrations may be above the Statewide average at any particular site. In addition, the distribution of data used to determine the statewide average overlaps the distribution associated with contaminated sites. Therefore, the Department will require a tiered approach to determine if the concentrations observed at a site are background; this will determine, in part, the need for remedial action.

The tiered approached is based upon a statistical evaluation of the statewide background data. Accordingly, the Department will continue to require reporting at the current Direct Exposure Criteria of 1.7 ppm. Above this value, an evaluation will be required in order to determine whether the observed concentrations at a particular site reflect either a release or a background condition. The requirements for this evaluation, which are outlined below, reflect the statistical distribution observed in the statewide background studies. In this tiered system the level of documentation and investigation will be lower for sites whose concentration are near the mean and more for sites which are further away from the mean. Previously the same level of documentation and investigation was required at all sites independent of the observed concentration.

Background determinations for concentrations within Tier 1 and Tier 2 will be the responsibility of an Environmental Professional. An Environmental Professional must submit a certification that the site conditions are background. This certification must document that the concentrations are background. The certification must include a discussion including but not limited to the information listed in each tier below.

Tier 1: Concentrations of arsenic between 1.7 ppm and 4 ppm

Background certifications in this tier must include, at a minimum, the following:

- Submittal of an evaluation of the spatial distribution of analytical data to determine if concentrations of arsenic are unrelated to potential releases throughout the site;

- Submittal of an evaluation of the site's history to determine if arsenic was used onsite and could have contributed to a release; and

- The remediation goal will be the site specific background level determined by the study.

If certified to be background the Department will issue a Non- Jurisdictional Letter based on the certification. The certification that site condition is background is the responsibility of the Environmental Professional. The Department may, however, at any time, audit the certification

and may require additional information and/or sampling at the site. The audit will consist of a review of the submitted notification to determine if the above minimum requirements were met.

If determined by the Environmental Professional to be a release, the notification should include proposed best management practices as a remedy for the site. These best management practices typically include excavation and/or the use of engineered controls such as a soil or asphalt cap with an appropriate Environmental Land Usage Restriction (ELUR).

Tier 2: Concentrations of arsenic between 4 ppm and 7 ppm

Background certifications in this tier must include the, at a minimum, the following:

- Submittal of an evaluation of the spatial distribution of analytical data to determine if concentrations of arsenic are unrelated to potential releases throughout the site;
- Submittal of an evaluation of the site's history to determine if arsenic was used onsite and could have contributed to a release;
- Submittal of an evaluation surrounding sites data via file reviews; and
- The remediation goal will be set at the site specific background level determined by the study.

If certified to be background the Department will issue a Non- Jurisdictional Letter based on the certification. The certification that site condition is background is the responsibility of the Environmental Professional. The Department may, however, at any time, audit the certification and may require additional information and/or sampling at the site. The audit will consist of a review of the submitted notification to determine if the above minimum requirements were met.

If determined by the Environmental Professional to be a release, the notification should include proposed best management practices as a remedy for the site. These best management practices typically include excavation and/or the use of engineered controls such as a soil or asphalt cap with an appropriate Environmental Land Usage Restriction (ELUR).

Tier 3: Concentrations of arsenic above 7 ppm

Arsenic concentrations above 7 ppm will be assumed by the Department as attributable to a release and will automatically require some level of response action as outlined in the Remediation Regulations, consistent with exceedances of any other Method 1 Residential Direct Exposure Criterion including, but not limited to, a full background study.

Department will require a full site-specific background study concentrations above 7ppm. This study will be used to determine the site-specific remedial goal. The background study proposal should at a minimum include, but not be limited to, the proposed sampling locations (including

reasoning and justification for selection), plans for soil type classification to confirm that the proposed soil sampling locations have the same characteristics as the soil at the site, procedures for obtaining access (i.e. permission) to sample any proposed off-site background locations, the proposed statistical method to be used to evaluate the collected data, and the proposed analytical testing method.

Residual levels of arsenic above the site-specific background concentration will not be allowed to remain on-site unless there is an approved engineered control in place with an associated ELUR requiring maintenance of the remedy. This approach is consistent with the Department's regulation of other sites in the program that have residual exceedences of any Method 1 Direct Exposure Criterion. This approach does not preclude performing parties from exercising their options under the Remediation Regulations to conduct Method 3 risk assessments or site-specific background determinations.

It is important to note that the site-specific background concentration may exceed both the risk-derived residential arsenic concentration (0.4 mg/kg) and the risk-derived industrial/commercial arsenic concentration (3.8 mg/kg). Subsequently, compliance with the site-specific background concentration may result in increased risk at the site posed by residual arsenic existing below the level that is considered jurisdictional. Furthermore, since the site specific background concentration will functionally demarcate the transition between a release-driven issue and a health-driven issue, the Department of Health (DOH) may provide additional guidance regarding proper management of residual arsenic concentrations. Finally, all soils must be managed in accordance with the Department's current and future requirements and polices.

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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES

AIR POLLUTION CONTROL REGULATION NO. 5

FUGITIVE DUST

Effective: 2 August 1967

Last Amended: 19 July 2007

AUTHORITY: These regulations are authorized pursuant to R.I. Gen. Laws § 42-17.1-2(s) and 23-23, as amended, and have been promulgated pursuant to the procedures set forth in the R.I. Administrative Procedures Act, R.I. Gen. Laws Chapter 42-35.

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES
AIR POLLUTION CONTROL REGULATION NO. 5

FUGITIVE DUST

5.1 Definitions

Unless otherwise expressly defined in this section, the terms used in this regulation shall be defined by reference to the Rhode Island Air Pollution Control General Definitions Regulation.

5.2 Applicability

This regulation shall apply, but not be limited to, the generation of airborne particulate matter from the following activities:

(a) The demolition, construction or renovation of buildings, bridges or other structures;

(b) Material stockpiles, including solid waste management facilities, and earth moving activities, including the clearing of land and other operations which cause airborne particulate matter;

(c) Stationary sources, as defined in the Air Pollution Control Regulations, whose activities involve the handling of materials which cause airborne particulate matter;

(d) Exterior surface preparation/resurfacing operations conducted on buildings, bridges, or other structures that are not regulated by the requirements of Air Pollution Control Regulation No. 24 entitled, "Removal of Lead Based Paint from Exterior Surfaces", as well as surface preparation/resurfacing operations conducted on vehicles, vessels, or any other surfaces which cause airborne particulate matter;

(e) Vehicles transporting materials which cause airborne particulate matter;

(f) Paved roads onto which earth or other material has been deposited by trucking or earth-moving equipment, by erosion by water, by the sanding and/or salting of roadways, or by other means;

(g) Commercial mining and/or quarrying operations including the construction, maintenance, and operation of a commercial mining and/or quarrying

facility, as well as activities which involve the use of explosive materials which cause airborne particulate matter; and

(h) Any other activities or operations which the Director may determine cause airborne particulate matter.

5.3 Requirements

No person shall cause or permit any materials, including but not limited to sand, gravel, soil, aggregate and any other organic or inorganic solid matter capable of releasing dust, to be handled, transported, mined, quarried, stored or otherwise utilized in any way so as to cause airborne particulate matter to travel beyond the property line of the emission source without taking adequate precautions to prevent particulate matter from becoming airborne. Such precautions shall be in accordance with good industrial practice as determined by the Director and/or shall be other reasonable fugitive dust prevention measures as determined by the Director.

5.4 General Provisions

5.4.1 Purpose

The purpose of this regulation is to limit the release of fugitive dust.

5.4.2 Authority

These regulations are authorized pursuant to R.I. Gen. Laws § 42-17.1-2(s) and 23-23, as amended, and have been promulgated pursuant to the procedures set forth in the R.I. Administrative Procedures Act, R.I. Gen. Laws Chapter 42-35

5.4.3 Application

The terms and provisions of this regulation shall be liberally construed to permit the Department to effectuate the purposes of state law, goals and policies.

5.4.4 Severability

If any provision of this regulation or the application thereof to any person or circumstance, is held invalid by a court of competent jurisdiction, the validity of the remainder of the regulation shall not be affected thereby.

5.4.5 Effective Date

The foregoing regulation, "Fugitive Dust", as amended, after due notice, is hereby adopted and filed with the Secretary of State this _____ day of _____, 20___ to become effective twenty (20) days thereafter, in accordance with the provisions of Chapters 23-23, 42-35, 42-17.1, 42-17.6, of the General Laws of Rhode Island of 1956, as amended.

W. Michael Sullivan, PhD., Director
Department of Environmental Management

Notice Given on: February 21, 2007

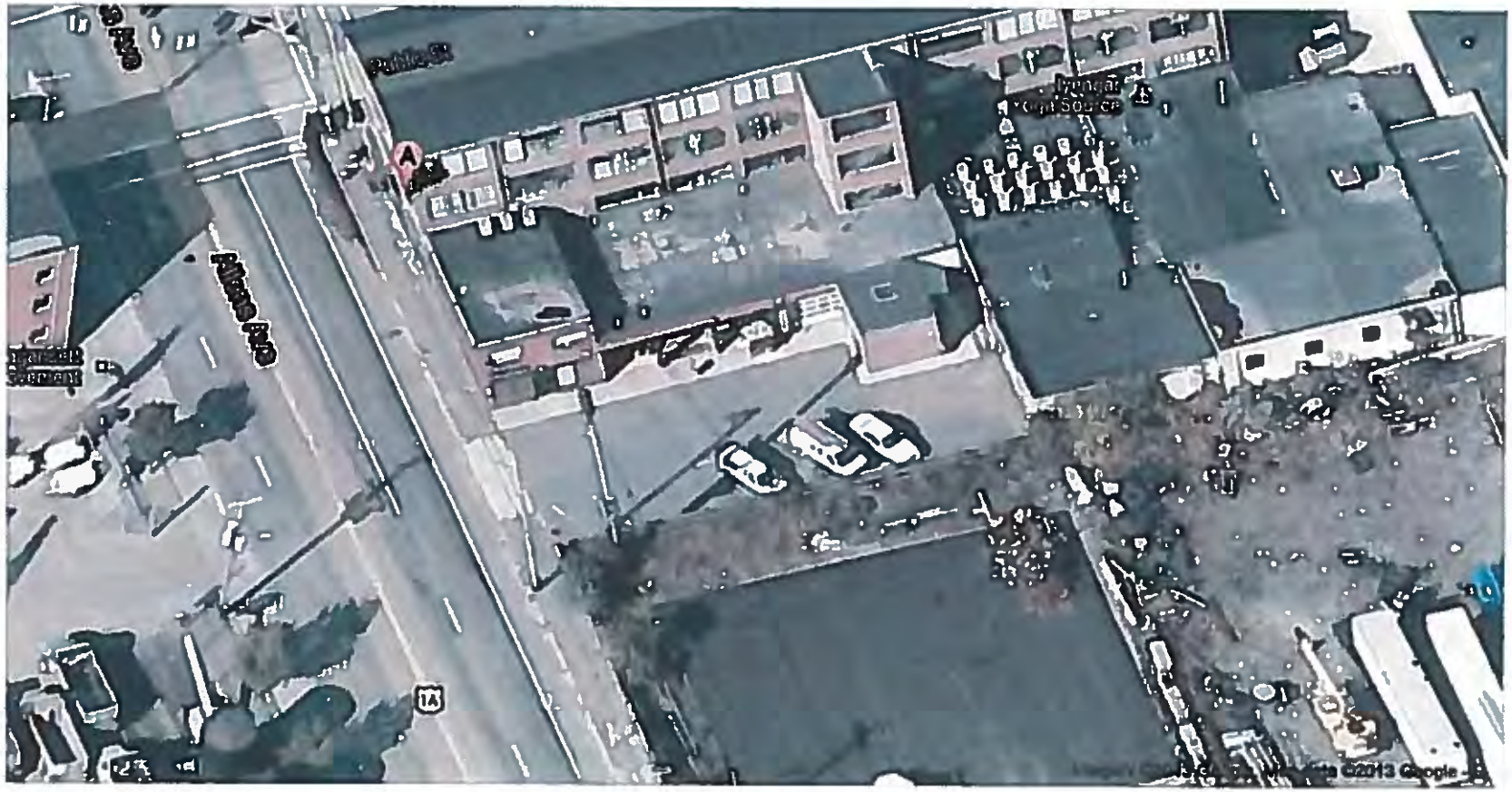
Public Hearing held: March 23, 2007

Filing Date: June 29, 2007

Effective Date: July 19, 2007

Google

To see all the details that are visible on the screen, use the "Print" link next to the map.

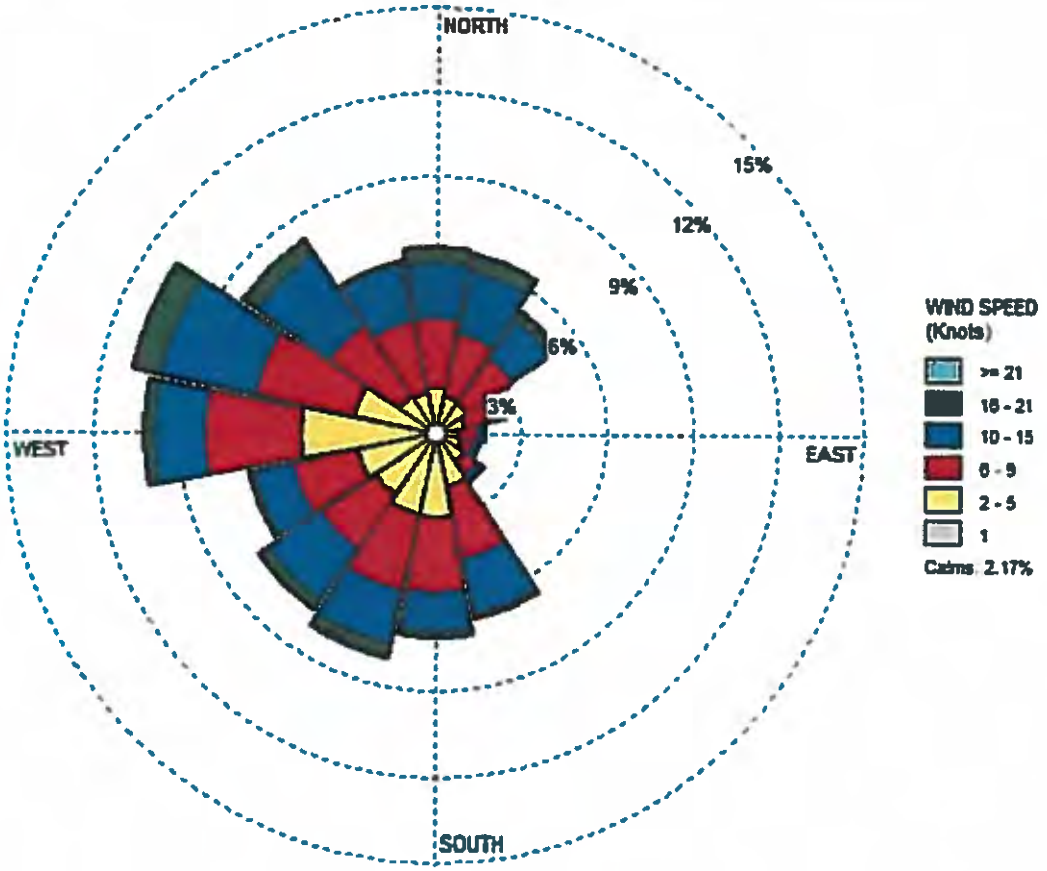


Google

To see all the details that are visible on the screen, use the "Print" link next to the map.

airport should be representative of the site conditions since it is in relatively close proximity (19 miles). The National Land Cover Data (NCLD92) that is used as input to AERSURFACE was also obtained from RIDEM.

Figure 2-1 Windrose Plot for Providence, Rhode Island (2007-2011)



2.2 Urban Versus Rural

The Urban option was used in the AERMOD modeling analysis due to the fact that RIDEM uses the Urban option for all modeling performed for Rhode Island. The 2011 Census data was used for the population, which is required input.

www.windfinder.com/windstats/windstatistic

Wind & weather statistics P...

typical wind direction Providence RI

more >

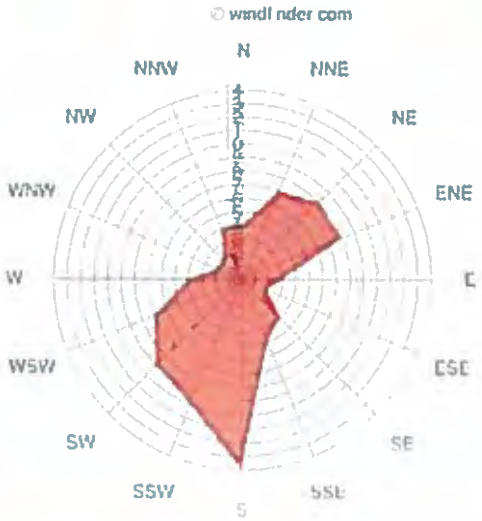
Warnings by noaa.gov

Wind statistics | Report | Forecast | Super Forecast | Tides | Webcams | Maps

Statistics based on observations taken between 4/2010 - 8/2013 daily from 7am to 7pm local time You can order the raw wind and weather data in Excel format from our historical weather data request page

Month of year	Jan 01	Feb 02	Mar 03	Apr 04	May 05	Jun 06	Jul 07	Aug 08	Sep 09	Oct 10	Nov 11	Dec 12	SUM 1-12
Dominant Wind dir													
Wind probability >= 4 Beaufort (%)	26	30	39	45	33	29	25	25	24	29	24	28	29
Average Wind speed (mph)	9	10	12	12	10	10	9	10	9	10	9	10	9
Average air temp (°F)				55	64		80	77	69	60	48		55
Select month (Help)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year

Wind dir distribution Providence Harbor September



Wind direction Distribution September(%)

OHI

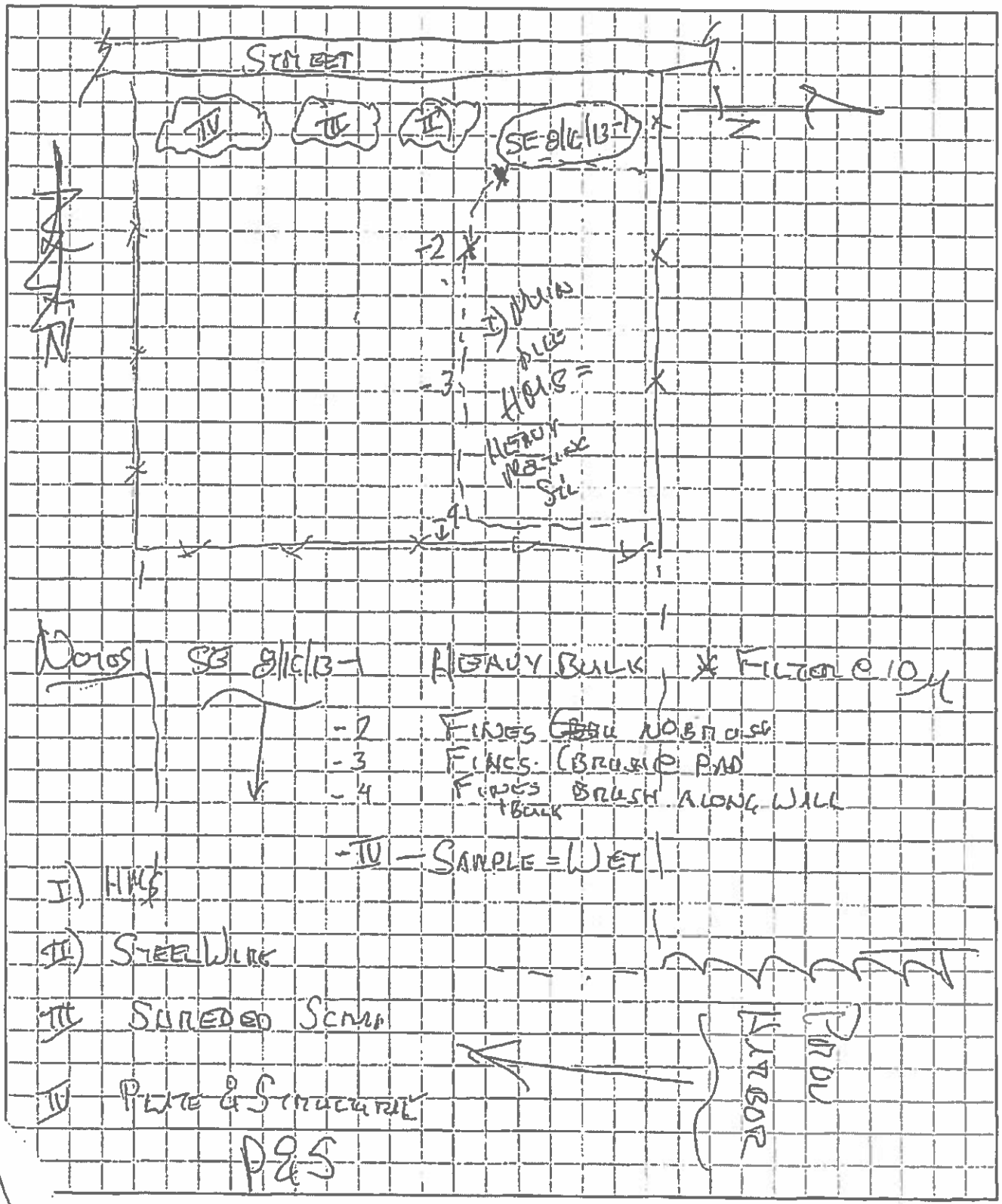
OccuHealth, Inc.
44 Wood Ave
Mansfield, MA 02048
508-339-9119

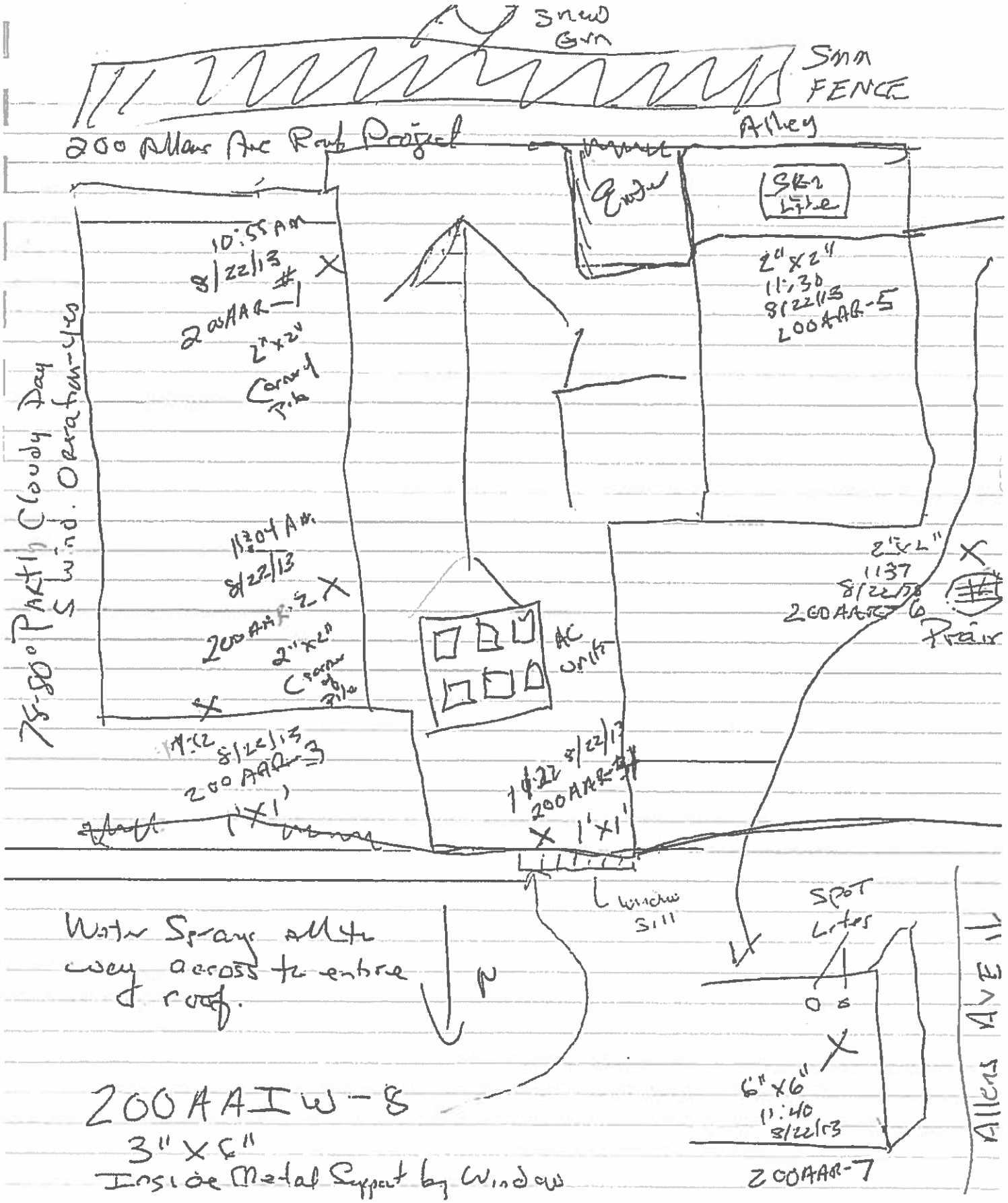
Job SMM 242 Allens Ave, Providence RI

Sheet ____ of ____

Responsible Person [signature]

Date 8/16/2013




Snow Gun
Snow FENCE
200 Allens Ave Roof Project
Alley
Equip
SKY Light
10:55 AM
8/22/13
200AAR-1
2"x2"
Corner Pole
2"x2"
11:30
8/22/13
200AAR-5
11:04 AM
8/22/13
200AAR-2
2"x2"
Corner Pole
AC units
2"x4"
1137
8/22/13
200AAR-6
Drain
75-80° Partly Cloudy Day
Wind. Operation-yes
11:12
8/22/13
200AAR-3
1'x1'
11:22
8/22/13
200AAR-4
1'x1'
Window Sill
Water Spray all the way across the entire roof.
N
200AAIW-8
3"x6"
Inside Metal Support by Window
11:48
8/22-13
SPOT Lights
6"x6"
11:40
8/22/13
200AAR-7
Allens AVE

HMS Metals Statistics			Metals*	% Metal
Sample Arithmetic Mean	Sample Standard Deviation	Percent Deviation	Percent Composition	Percent Metal in Dirt or dust
9618	826	9%	5%	0.96
9.29	2.02	22%	0%	
19.3	5.02	26%	0%	
643	261	41%	0%	
0.660	0.165	25%	0%	
27.9	9.15	33%	0%	
33775	16519	49%	17%	
272	63.8	23%	0.1%	0.03
29.8	5.35	18%	0.0%	
961	54.5	6%	0.5%	
139250	32263	23%	69%	14
1433	370	26%	0.7%	0.14
4135	558	13%	2.1%	
1231	229	19%	0.6%	
6.89	5.49	80%	0.0%	
231	21.1	9%	0.1%	
1644	617	38%	0.8%	
2.60	2.82	109%	0.0%	
7.44	4.09	55%	0.0%	
1383	545	39%	0.7%	
0.118	0.017	15%	0.0%	
62.4	13.3	21%	0.0%	
6310	2227	35%	3.1%	0.6

201051

: HMS metals site. (Scrap pile)

ts Ave									Roof Metals Statistics			Metals*	Inside 200 Aliens Avenue	
Lab t pe	200AAR-5 (ug/ft2)	200AAR-6 Lab Result ug/Swipe	200AAR-6 (ug/ft2)	200AAR-7 Lab Result ug/Swipe	200AAR-7 (ug/ft2)	200AARIW-8 (ug/swipe)	200AARIW-8 (ug/ft2)	200AAR- Field Blank (ug/Swipe)	Sample Arithmetic Mean	Sample Range	Sample Median	Percent Composition Roof	Contaminant	Percent Metals Inside 200 Aliens Ave
)	432000	5000	180000	9200	36800	1600	12800		293771			10.0%	Aluminum	8.3%
	2736	68	2448	67	268	67	536	50	0			0.0%	Antimony	0.0%
	396	4 7	169.2	7.8	31.2	1 8	14.4		233			0.0%	Arsenic	0.0%
	9360	130	4680	190	760	99	792		10600			0.4%	Barium	0.5%
	ND	ND	ND	ND	ND	ND	0		0			0.0%	Beryllium	0.0%
	360	6 3	226.8	6 6	26.4	5 8	46.4		267			0.0%	Cadmium	0.0%
	208800	2300	9200	4500	18000	3500	28000		194171			6.6%	Calcium	18.1%
	7200	78	2808	140	560	23	184		4585			0.2%	Chromium	0.1%
	792	9 4	338.4	35	80	6 7	53.6		533			0.0%	Cobalt	0.0%
	28800	370	13320	660	2640	140	1120		21514			0.7%	Copper	0.7%
)	3132000	34000	1224000	64000	256000	11000	88000	2.9	2057714			70.1%	Iron	56.9%
	28080	380	13680	610	2440	150	1200		19691			0.7%	Lead	0.8%
	176400	2200	79200	4200	16800	720	5760		119143			4.1%	Magnesium	3.7%
	30240	370	13320	820	2480	110	880		24166			0.8%	Manganese	0.8%
	NT	NT	NT	NT	NT	NT	0		0			0.0%	Mercury	0.0%
	5040	56	2016	99	396	18	144		3271			0.1%	Nickel	0.1%
	86400	1100	39600	2200	8800	510	4080		91287			3.1%	Potassium	2.5%
	ND	ND	ND	ND	ND	ND	0		0			0.0%	Selenium	0.0%
	156	ND	ND	4 4	17.6	0 78	6.24		0			0.0%	Silver	0.0%
	20520	ND	ND	ND	ND	670	5360		0			0.0%	Sodium	3.5%
	ND	ND	ND	ND	ND	ND	0		0			0.0%	Thallium	0.0%
	1908	24	864	41	164	7 2	57.6		1253			0.0%	Vanadium	0.0%
	104400	1300	68400	1900	7600	700	5600		91703			3.1%	Zinc	3.6%
							154634		2934102					

STATE FORM - CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL

WESTBORO, MA TEL. 508-898-9220 FAX: 508-898-9193

MANSFIELD, MA TEL. 508-822-9300 FAX. 508-822-3288

Date Rec'd in Lab:

ALPHA Job #:

Client Information

Client: A Kelly Engineering

Address: 200 Hitchcock Ave
Site is 4x Attleboro
rd North to Occuhealth

Phone:

Fax:

Email: resp1@occ 1.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Stockpile for Attleboro Ave

Project Location: 242 Attleboro Ave
Metals Scrap Yard

Project/PWS ID#:

Project Manager: Dan Scrocchi

ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL

☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #: Occuhealth Inc

Please Indicate PWS Class Below

☐ COM

☐ NTNC

☐ TNC

Other Project Specific Requirements/Comments/Detection Limits:

Very limited Sample #'s on ice at site, Send results to results@occuhealth.com

SAMPLES FOR POTENTIAL LITIGATION

ANALYSIS: Full Metals Scan

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do

(PLEASE CHECK BELOW)

ALPHA Lab ID (Lab Use Only)	DEP Location Code	DEP Location Name	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Source(1) Multiple	Source(1) Single	Type Raw	Type Finished	Sample(2) Routine	Sample(2) Special	TOTAL # BOTTLES
SS	081613-1	Scrap pile #1	8/16/13	10:10	Dirt	CAT							
	081613-2	Scrap Pile #2	8/16/13	10:15	Dust	CAT							
	081613-3	Scrap Pile #3	8/16/13	10:30	Dust	CAT							
	081615-4	Scrap Pile #4	8/16/13	10:40	Dirt	CAT							
	~~081613SS5~~												
	081613SS6	Shallow	8/16/13	1041	Dirt	CAT							
	081613SS7	Shredded Scrap	8/16/13	1050	Dirt	CAT							
	081613SS8	Plate structure	8/16/13	11:00	Dirt	CAT							

Analysis: Total Dry weight, Screen PM10, PM-10 weight, Metals Scan, PM-10, Shape Screening Curve

Dirt. Call Robert Tucinardi.

Container Type													
Preservative													

(1) If Source is Multiple, please list connected sources
(2) If Sample type is special please explain

Relinquished By:	Date/Time	Received By:	Date/Time
Client/Scientist	8/16/13		

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-15 (rev. 16-NOV-1

ALPHA ANALYTICAL

ANALYTICAL REPORT

Lab Number:	L1316180
Client:	OccuHealth 44 Wood Avenue Mansfield, MA 02048
ATTN:	Dave Scarchilli
Phone:	(508) 339-9119
Project Name:	SMM 272 ALLENS AVE
Project Number:	METALS SCRAP YARD
Report Date:	08/28/13

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), PA (68-02089), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), DOD (L2217.01), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1316180-01	SS 081613-1 SCRAP PILE #1	272 ALLENS AVE	08/16/13 10:10
L1316180-02	081613-2 SCRAP PILE #2	272 ALLENS AVE	08/16/13 10:15
L1316180-03	081613-3 SCRAP PILE #3	272 ALLENS AVE	08/16/13 10:30
L1316180-04	081613-4 SCRAP PILE #4	272 ALLENS AVE	08/16/13 10:40
L1316180-05	081613 SWII STEEL WIRE	272 ALLENS AVE	08/16/13 10:45
L1316180-06	081613 SSIII SHREDDED SCRAP	272 ALLENS AVE	08/16/13 10:50
L1316180-07	081613 P&S IV PLATE & STRUCTUR	272 ALLENS AVE	08/16/13 11:00

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples free of charge for 30 days from the date the project is completed. After 30 days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

Case Narrative (continued)

All samples were sieved through a #230 sieve prior to metals digestions and analysis.

Metals

The WG631551-4 MS recovery, performed on sample L1316180-01, is above the acceptance criteria for Silver, total (129%); however, the associated LCS recovery was within criteria. No further action was taken.

The WG631553-4 MS recovery for Aluminum, total (217%), Calcium, total (171%), Iron, total (1530%), Lead, total (126%) and Zinc, total (212%), performed on sample L1316180-01, does not apply because the sample concentration is greater than four times the spike amount added.

The WG631554-4 MS recovery for Mercury, total (0%), performed on sample L1316180-02, does not apply because the sample concentration is greater than four times the spike amount added.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Elizabeth Porta

Title: Technical Director/Representative

Date: 08/28/13

METALS

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

SAMPLE RESULTS

Lab ID:	L1316180-01	Date Collected:	08/16/13 10:10
Client ID:	SS 081613-1 SCRAP PILE #1	Date Received:	08/16/13
Sample Location:	272 ALLENS AVE	Field Prep:	Not Specified
Matrix:	Soil		
Percent Solids:	Results are reported on an 'AS RECEIVED' basis.		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	9690		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Antimony, Total	6.37		mg/kg	0.255	--	10	08/26/13 12:00	08/27/13 14:58	EPA 3050B	1,6020A	PD
Arsenic, Total	16.7		mg/kg	0.263	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Barium, Total	418		mg/kg	1.58	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Beryllium, Total	0.560		mg/kg	0.158	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Cadmium, Total	19.8		mg/kg	0.105	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Calcium, Total	12700		mg/kg	2630	--	100	08/26/13 12:00	08/27/13 14:08	EPA 3050B	1,6020A	PD
Chromium, Total	362		mg/kg	1.05	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Cobalt, Total	23.9		mg/kg	0.263	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Copper, Total	941		mg/kg	1.05	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Iron, Total	184000		mg/kg	1050	--	100	08/26/13 12:00	08/27/13 14:08	EPA 3050B	1,6020A	PD
Lead, Total	1060		mg/kg	3.16	--	100	08/26/13 12:00	08/27/13 14:08	EPA 3050B	1,6020A	PD
Magnesium, Total	3460		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Manganese, Total	1440		mg/kg	1.05	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Mercury, Total	4.27		mg/kg	0.266	--	100	08/26/13 12:00	08/27/13 12:50	EPA 7474	1,7474	LR
Nickel, Total	224		mg/kg	0.526	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Potassium, Total	885		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Selenium, Total	0.859		mg/kg	0.526	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Silver, Total	1.46		mg/kg	0.255	--	10	08/26/13 12:00	08/27/13 14:58	EPA 3050B	1,6020A	PD
Sodium, Total	623		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Thallium, Total	ND		mg/kg	0.105	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Vanadium, Total	55.1		mg/kg	0.526	--	10	08/26/13 12:00	08/27/13 12:03	EPA 3050B	1,6020A	PD
Zinc, Total	3220		mg/kg	52.6	--	100	08/26/13 12:00	08/27/13 14:08	EPA 3050B	1,6020A	PD

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

SAMPLE RESULTS

Lab ID:	L1316180-02	Date Collected:	08/16/13 10:15
Client ID:	081613-2 SCRAP PILE #2	Date Received:	08/16/13
Sample Location:	272 ALLENS AVE	Field Prep:	Not Specified
Matrix:	Soil		
Percent Solids:	Results are reported on an 'AS RECEIVED' basis.		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	8460		mg/kg	50.5	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Antimony, Total	10.3		mg/kg	0.272	--	10	08/26/13 12:00	08/27/13 15:03	EPA 3050B	1,6020A	PD
Arsenic, Total	18.6		mg/kg	0.252	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Barium, Total	583		mg/kg	1.52	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Beryllium, Total	0.505		mg/kg	0.152	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Cadmium, Total	29.7		mg/kg	0.101	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Calcium, Total	37500		mg/kg	2520	--	100	08/26/13 12:00	08/27/13 14:15	EPA 3050B	1,6020A	PD
Chromium, Total	236		mg/kg	1.01	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Cobalt, Total	28.4		mg/kg	0.252	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Copper, Total	916		mg/kg	1.01	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Iron, Total	134000		mg/kg	1010	--	100	08/26/13 12:00	08/27/13 14:15	EPA 3050B	1,6020A	PD
Lead, Total	1940		mg/kg	3.03	--	100	08/26/13 12:00	08/27/13 14:15	EPA 3050B	1,6020A	PD
Magnesium, Total	3900		mg/kg	50.5	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Manganese, Total	1090		mg/kg	1.01	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Mercury, Total	15.1		mg/kg	0.266	--	100	08/26/13 12:00	08/27/13 12:52	EPA 7474	1,7474	LR
Nickel, Total	252		mg/kg	0.505	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Potassium, Total	1490		mg/kg	50.5	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Selenium, Total	1.61		mg/kg	0.505	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Silver, Total	8.21		mg/kg	0.272	--	10	08/26/13 12:00	08/27/13 15:03	EPA 3050B	1,6020A	PD
Sodium, Total	1660		mg/kg	50.5	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Thallium, Total	0.105		mg/kg	0.101	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Vanadium, Total	62.4		mg/kg	0.505	--	10	08/26/13 12:00	08/27/13 12:06	EPA 3050B	1,6020A	PD
Zinc, Total	8220		mg/kg	50.5	--	100	08/26/13 12:00	08/27/13 14:15	EPA 3050B	1,6020A	PD

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

SAMPLE RESULTS

Lab ID:	L1316180-03	Date Collected:	08/16/13 10:30
Client ID:	081613-3 SCRAP PILE #3	Date Received:	08/16/13
Sample Location:	272 ALLENS AVE	Field Prep:	Not Specified
Matrix:	Soil		
Percent Solids:	Results are reported on an 'AS RECEIVED' basis.		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	10400		mg/kg	46.3	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Antimony, Total	10.9		mg/kg	0.255	--	10	08/26/13 12:00	08/27/13 15:04	EPA 3050B	1,6020A	PD
Arsenic, Total	26.6		mg/kg	0.231	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Barium, Total	1020		mg/kg	1.39	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Beryllium, Total	0.874		mg/kg	0.139	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Cadmium, Total	40.0		mg/kg	0.093	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Calcium, Total	32200		mg/kg	2310	--	100	08/26/13 12:00	08/27/13 14:16	EPA 3050B	1,6020A	PD
Chromium, Total	271		mg/kg	0.926	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Cobalt, Total	36.8		mg/kg	0.231	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Copper, Total	945		mg/kg	0.926	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Iron, Total	132000		mg/kg	926	--	100	08/26/13 12:00	08/27/13 14:16	EPA 3050B	1,6020A	PD
Lead, Total	1420		mg/kg	2.78	--	100	08/26/13 12:00	08/27/13 14:16	EPA 3050B	1,6020A	PD
Magnesium, Total	4520		mg/kg	46.3	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Manganese, Total	1410		mg/kg	0.926	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Mercury, Total	3.69		mg/kg	0.126	--	50	08/26/13 12:00	08/27/13 13:07	EPA 7474	1,7474	LR
Nickel, Total	244		mg/kg	0.463	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Potassium, Total	1850		mg/kg	46.3	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Selenium, Total	6.81		mg/kg	0.463	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Silver, Total	9.70		mg/kg	0.255	--	10	08/26/13 12:00	08/27/13 15:04	EPA 3050B	1,6020A	PD
Sodium, Total	1870		mg/kg	46.3	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Thallium, Total	0.138		mg/kg	0.093	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Vanadium, Total	51.0		mg/kg	0.463	--	10	08/26/13 12:00	08/27/13 11:35	EPA 3050B	1,6020A	PD
Zinc, Total	6200		mg/kg	46.3	--	100	08/26/13 12:00	08/27/13 14:16	EPA 3050B	1,6020A	PD

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

SAMPLE RESULTS

Lab ID:	L1316180-04	Date Collected:	08/16/13 10:40
Client ID:	081613-4 SCRAP PILE #4	Date Received:	08/16/13
Sample Location:	272 ALLENS AVE	Field Prep:	Not Specified
Matrix:	Soil		
Percent Solids:	Results are reported on an 'AS RECEIVED' basis.		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	9920		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Antimony, Total	9.57		mg/kg	0.272	--	10	08/26/13 12:00	08/27/13 15:05	EPA 3050B	1,6020A	PD
Arsenic, Total	15.4		mg/kg	0.266	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Barium, Total	551		mg/kg	1.60	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Beryllium, Total	0.701		mg/kg	0.160	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Cadmium, Total	21.9		mg/kg	0.106	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Calcium, Total	52700		mg/kg	2660	--	100	08/26/13 12:00	08/27/13 14:17	EPA 3050B	1,6020A	PD
Chromium, Total	219		mg/kg	1.06	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Cobalt, Total	30.2		mg/kg	0.266	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Copper, Total	1040		mg/kg	1.06	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Iron, Total	107000		mg/kg	1060	--	100	08/26/13 12:00	08/27/13 14:17	EPA 3050B	1,6020A	PD
Lead, Total	1310		mg/kg	3.19	--	100	08/26/13 12:00	08/27/13 14:17	EPA 3050B	1,6020A	PD
Magnesium, Total	4660		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Manganese, Total	982		mg/kg	1.06	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Mercury, Total	4.48		mg/kg	0.272	--	100	08/26/13 12:00	08/27/13 13:10	EPA 7474	1,7474	LR
Nickel, Total	205		mg/kg	0.532	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Potassium, Total	2350		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Selenium, Total	1.12		mg/kg	0.532	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Silver, Total	10.4		mg/kg	0.272	--	10	08/26/13 12:00	08/27/13 15:05	EPA 3050B	1,6020A	PD
Sodium, Total	1380		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Thallium, Total	0.112		mg/kg	0.106	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Vanadium, Total	81.1		mg/kg	0.532	--	10	08/26/13 12:00	08/27/13 11:37	EPA 3050B	1,6020A	PD
Zinc, Total	7600		mg/kg	53.2	--	100	08/26/13 12:00	08/27/13 14:17	EPA 3050B	1,6020A	PD

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD
Lab Number: L1316180
Report Date: 08/28/13

SAMPLE RESULTS

Lab ID: L1316180-05
Client ID: 081613 SWII STEEL WIRE
Sample Location: 272 ALLENS AVE
Matrix: Soil
Percent Solids: Results are reported on an 'AS RECEIVED' basis.

Date Collected: 08/16/13 10:45
Date Received: 08/16/13
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	6160		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Antimony, Total	5.28		mg/kg	0.272	--	10	08/26/13 12:00	08/27/13 15:06	EPA 3050B	1,6020A	PD
Arsenic, Total	15.9		mg/kg	0.263	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Barium, Total	253		mg/kg	1.58	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Beryllium, Total	0.491		mg/kg	0.158	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Cadmium, Total	10.8		mg/kg	0.105	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Calcium, Total	19400		mg/kg	2630	--	100	08/26/13 12:00	08/27/13 14:18	EPA 3050B	1,6020A	PD
Chromium, Total	165		mg/kg	1.05	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Cobalt, Total	31.5		mg/kg	0.263	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Copper, Total	1160		mg/kg	1.05	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Iron, Total	252000		mg/kg	1050	--	100	08/26/13 12:00	08/27/13 14:18	EPA 3050B	1,6020A	PD
Lead, Total	1040		mg/kg	3.16	--	100	08/26/13 12:00	08/27/13 14:18	EPA 3050B	1,6020A	PD
Magnesium, Total	2850		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Manganese, Total	2100		mg/kg	1.05	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Mercury, Total	1.09		mg/kg	0.066	--	25	08/26/13 12:00	08/27/13 13:12	EPA 7474	1,7474	LR
Nickel, Total	130		mg/kg	0.526	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Potassium, Total	1240		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Selenium, Total	0.794		mg/kg	0.526	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Silver, Total	4.76		mg/kg	0.272	--	10	08/26/13 12:00	08/27/13 15:06	EPA 3050B	1,6020A	PD
Sodium, Total	368		mg/kg	52.6	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Thallium, Total	ND		mg/kg	0.105	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Vanadium, Total	29.5		mg/kg	0.526	--	10	08/26/13 12:00	08/27/13 11:39	EPA 3050B	1,6020A	PD
Zinc, Total	4910		mg/kg	52.6	--	100	08/26/13 12:00	08/27/13 14:18	EPA 3050B	1,6020A	PD

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

SAMPLE RESULTS

Lab ID:	L1316180-06	Date Collected:	08/16/13 10:50
Client ID:	081613 SSIII SHREDDED SCRAP	Date Received:	08/16/13
Sample Location:	272 ALLENS AVE	Field Prep:	Not Specified
Matrix:	Soil		
Percent Solids:	Results are reported on an 'AS RECEIVED' basis.		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	8620		mg/kg	51.0	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Antimony, Total	13.3		mg/kg	0.269	--	10	08/26/13 12:00	08/27/13 15:07	EPA 3050B	1,6020A	PD
Arsenic, Total	13.4		mg/kg	0.255	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Barium, Total	503		mg/kg	1.53	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Beryllium, Total	0.532		mg/kg	0.153	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Cadmium, Total	46.8		mg/kg	0.102	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Calcium, Total	37600		mg/kg	2550	--	100	08/26/13 12:00	08/27/13 14:20	EPA 3050B	1,6020A	PD
Chromium, Total	187		mg/kg	1.02	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Cobalt, Total	27.5		mg/kg	0.255	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Copper, Total	982		mg/kg	1.02	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Iron, Total	191000		mg/kg	1020	--	100	08/26/13 12:00	08/27/13 14:20	EPA 3050B	1,6020A	PD
Lead, Total	2080		mg/kg	3.06	--	100	08/26/13 12:00	08/27/13 14:20	EPA 3050B	1,6020A	PD
Magnesium, Total	3520		mg/kg	51.0	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Manganese, Total	1270		mg/kg	1.02	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Mercury, Total	2.18		mg/kg	0.066	--	25	08/26/13 12:00	08/27/13 13:15	EPA 7474	1,7474	LR
Nickel, Total	218		mg/kg	0.510	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Potassium, Total	1470		mg/kg	51.0	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Selenium, Total	2.48		mg/kg	0.510	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Silver, Total	10 5		mg/kg	0.269	--	10	08/26/13 12:00	08/27/13 15:07	EPA 3050B	1,6020A	PD
Sodium, Total	1110		mg/kg	51.0	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Thallium, Total	0.116		mg/kg	0.102	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Vanadium, Total	26.2		mg/kg	0 510	--	10	08/26/13 12:00	08/27/13 11:41	EPA 3050B	1,6020A	PD
Zinc, Total	26200		mg/kg	102	--	200	08/26/13 12 00	08/27/13 14:24	EPA 3050B	1,6020A	PD

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

SAMPLE RESULTS

Lab ID:	L1316180-07	Date Collected:	08/16/13 11:00
Client ID:	081613 P&S IV PLATE & STRUCTUR	Date Received:	08/16/13
Sample Location:	272 ALLENS AVE	Field Prep:	Not Specified
Matrix:	Soil		
Percent Solids:	Results are reported on an 'AS RECEIVED' basis.		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	9130		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Antimony, Total	7.47		mg/kg	0.260	--	10	08/26/13 12:00	08/27/13 15:08	EPA 3050B	1,6020A	PD
Arsenic, Total	34.0		mg/kg	0.266	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Barium, Total	505		mg/kg	1.60	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Beryllium, Total	0.492		mg/kg	0.160	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Cadmium, Total	19.1		mg/kg	0.106	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Calcium, Total	30900		mg/kg	2660	--	100	08/26/13 12:00	08/27/13 14:21	EPA 3050B	1,6020A	PD
Chromium, Total	360		mg/kg	1.06	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Cobalt, Total	38.9		mg/kg	0.266	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Copper, Total	821		mg/kg	1.06	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Iron, Total	186000		mg/kg	1060	--	100	08/26/13 12:00	08/27/13 14:21	EPA 3050B	1,6020A	PD
Lead, Total	2040		mg/kg	3.19	--	100	08/26/13 12:00	08/27/13 14:21	EPA 3050B	1,6020A	PD
Magnesium, Total	5450		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Manganese, Total	1770		mg/kg	1.06	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Mercury, Total	2.36		mg/kg	0.068	--	25	08/26/13 12:00	08/27/13 13:17	EPA 7474	1,7474	LR
Nickel, Total	376		mg/kg	0.532	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Potassium, Total	2080		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Selenium, Total	1.00		mg/kg	0.532	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Silver, Total	3.87		mg/kg	0.260	--	10	08/26/13 12:00	08/27/13 15:08	EPA 3050B	1,6020A	PD
Sodium, Total	626		mg/kg	53.2	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Thallium, Total	0.134		mg/kg	0.106	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Vanadium, Total	64.8		mg/kg	0.532	--	10	08/26/13 12:00	08/27/13 11:43	EPA 3050B	1,6020A	PD
Zinc, Total	4800		mg/kg	53.2	--	100	08/26/13 12:00	08/27/13 14:21	EPA 3050B	1,6020A	PD

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD
Lab Number: L1316180
Report Date: 08/28/13

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-07 Batch: WG631551-1										
Antimony, Total	ND		mg/kg	0.050	--	2	08/26/13 12:00	08/27/13 14:57	1,6020A	PD
Silver, Total	ND		mg/kg	0.050	--	2	08/26/13 12:00	08/27/13 14:57	1,6020A	PD

Prep Information

Digestion Method: EPA 3050B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-07 Batch: WG631553-1										
Aluminum, Total	ND		mg/kg	10.0	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Arsenic, Total	ND		mg/kg	0.050	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Barium, Total	ND		mg/kg	0.300	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Beryllium, Total	ND		mg/kg	0.030	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Cadmium, Total	ND		mg/kg	0.020	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Calcium, Total	ND		mg/kg	50.0	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Chromium, Total	ND		mg/kg	0.200	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Cobalt, Total	ND		mg/kg	0.050	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Copper, Total	ND		mg/kg	0.200	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Iron, Total	ND		mg/kg	20.0	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Lead, Total	ND		mg/kg	0.060	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Magnesium, Total	ND		mg/kg	10.0	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Manganese, Total	ND		mg/kg	0.200	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Nickel, Total	ND		mg/kg	0.100	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Potassium, Total	ND		mg/kg	10.0	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Selenium, Total	ND		mg/kg	0.100	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Sodium, Total	ND		mg/kg	10.0	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Thallium, Total	ND		mg/kg	0.020	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Vanadium, Total	ND		mg/kg	0.100	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD
Zinc, Total	ND		mg/kg	1.00	--	2	08/26/13 12:00	08/27/13 11:16	1,6020A	PD

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD
Lab Number: L1316180
Report Date: 08/28/13

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3050B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-07 Batch: WG631554-1										
Mercury, Total	ND		mg/kg	0.013	--	5	08/26/13 12:00	08/27/13 12:45	1,7474	LR

Prep Information

Digestion Method: EPA 7474

Lab Control Sample Analysis

Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG631551-2 SRM Lot Number: S3SPIKE								
Antimony, Total	112		-		75-125	-		20
Silver, Total	106		-		75-125	-		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG631553-2 SRM Lot Number: A2METSPIKE					
Aluminum, Total	102	-	75-125	-	20
Arsenic, Total	102	-	75-125	-	20
Barium, Total	96	-	75-125	-	20
Beryllium, Total	104	-	75-125	-	20
Cadmium, Total	102	-	75-125	-	20
Calcium, Total	105	-	75-125	-	20
Chromium, Total	102	-	75-125	-	20
Cobalt, Total	106	-	75-125	-	20
Copper, Total	100	-	75-125	-	20
Iron, Total	96	-	75-125	-	20
Lead, Total	106	-	75-125	-	20
Magnesium, Total	102	-	75-125	-	20
Manganese, Total	100	-	75-125	-	20
Nickel, Total	104	-	75-125	-	20
Potassium, Total	102	-	75-125	-	20
Selenium, Total	100	-	75-125	-	20
Sodium, Total	102	-	75-125	-	20
Thallium, Total	102	-	75-125	-	20
Vanadium, Total	106	-	75-125	-	20
Zinc, Total	102	-	75-125	-	20

Lab Control Sample Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG631554-2 SRM Lot Number: HPHGAF					
Mercury, Total	104	-	80-120	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG631551-4 QC Sample: L1316180-01 Client ID: SS 081613-1 SCRAP PILE #1												
Antimony, Total	6.37	2	7.89	76		-	-		75-125	-		20
Silver, Total	1.46	2	4.04	129	Q	-	-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07	QC Batch ID: WG631553-4			QC Sample: L1316180-01			Client ID: SS 081613-1 SCRAP PILE #1			
Aluminum, Total	9690	1110	12100	217	Q	-	-	75-125	-	20
Arsenic, Total	16.7	222	230	96		-	-	75-125	-	20
Barium, Total	418	222	661	109		-	-	75-125	-	20
Beryllium, Total	0.560	111	118	106		-	-	75-125	-	20
Cadmium, Total	19.8	111	132	101		-	-	75-125	-	20
Calcium, Total	12700	1110	14600	171	Q	-	-	75-125	-	20
Chromium, Total	362	222	581	98		-	-	75-125	-	20
Cobalt, Total	23.9	222	246	100		-	-	75-125	-	20
Copper, Total	941	222	1120	80		-	-	75-125	-	20
Iron, Total	184000	1110	201000	1530	Q	-	-	75-125	-	20
Lead, Total	1060	222	1340	126	Q	-	-	75-125	-	20
Magnesium, Total	3460	1110	4780	120		-	-	75-125	-	20
Manganese, Total	1440	222	1670	104		-	-	75-125	-	20
Nickel, Total	224	222	451	102		-	-	75-125	-	20
Potassium, Total	885	1110	1910	92		-	-	75-125	-	20
Selenium, Total	0.859	222	199	89		-	-	75-125	-	20
Sodium, Total	623	1110	1680	95		-	-	75-125	-	20
Thallium, Total	ND	222	203	91		-	-	75-125	-	20
Vanadium, Total	55.1	222	273	98		-	-	75-125	-	20
Zinc, Total	3220	222	3690	212	Q	-	-	75-125	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG631554-4 QC Sample: L1316180-02 Client ID: 081613-2 SCRAP PILE #2										
Mercury, Total	15.1	0.672	14.5	0	Q	-	-	80-120	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP Y/

Lab Number: L1316180
Report Date: 08/28/13

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG631551-3 QC Sample: L1316180-01 Client ID: SS 081613-1 SCRAP PILE #1						
Antimony, Total	6.37	6.38	mg/kg	0		20
Silver, Total	1.46	1.66	mg/kg	13		20
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG631553-3 QC Sample: L1316180-01 Client ID: SS 081613-1 SCRAP PILE #1						
Calcium, Total	12700	13100	mg/kg	3		20
Iron, Total	184000	190000	mg/kg	3		20
Lead, Total	1060	1090	mg/kg	3		20
Zinc, Total	3220	3280	mg/kg	2		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP Y/

Lab Number: L1316180
Report Date: 08/28/13

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG631553-3 QC Sample: L1316180-01 Client ID: SS 081613-1 SCRAP PILE #1					
Aluminum, Total	9690	11300	mg/kg	15	20
Arsenic, Total	16.7	18.8	mg/kg	12	20
Barium, Total	418	468	mg/kg	11	20
Beryllium, Total	0.560	0.660	mg/kg	16	20
Cadmium, Total	19.8	22.2	mg/kg	11	20
Chromium, Total	362	415	mg/kg	14	20
Cobalt, Total	23.9	26.8	mg/kg	11	20
Copper, Total	941	1000	mg/kg	6	20
Magnesium, Total	3460	4080	mg/kg	16	20
Manganese, Total	1440	1640	mg/kg	13	20
Nickel, Total	224	245	mg/kg	9	20
Potassium, Total	885	987	mg/kg	11	20
Selenium, Total	0.859	0.969	mg/kg	12	20
Sodium, Total	623	750	mg/kg	18	20
Thallium, Total	ND	ND	mg/kg	NC	20
Vanadium, Total	55.1	63.2	mg/kg	14	20
Total Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG631554-3 QC Sample: L1316180-02 Client ID: 081613-2 SCRAP PILE #2					
Mercury, Total	15.1	14.7	mg/kg	3	20

Serial_No:08281314:16

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal
Cooler
N/A Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1316180-01A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-01B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)

*Values in parentheses indicate holding time in days

Serial_No:08281314:16

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1316180-02A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-02B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)
L1316180-03A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-03B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)

*Values in parentheses indicate holding time in days

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1316180-04A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-04B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)
L1316180-05A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-05B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)

*Values in parentheses indicate holding time in days

Project Name: SMM 272 ALLENS AVE
Project Number: METALS SCRAP YARD

Lab Number: L1316180
Report Date: 08/28/13

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1316180-06A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-06B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)
L1316180-07A	Amber 250ml unpreserved	N/A	N/A	19.4	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PREP-3050:1T(180)
L1316180-07B	Amber 250ml unpreserved split	N/A	N/A	19.4	Y	Absent	A2-AG-6020T(180)

*Values in parentheses indicate holding time in days

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

Data Qualifiers

M	- Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
NJ	- Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
P	- The RPD between the results for the two columns exceeds the method-specified criteria.
Q	- The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
R	- Analytical results are from sample re-analysis.
RE	- Analytical results are from sample re-extraction.
S	- Analytical results are from modified screening analysis.
J	- Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
ND	- Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	SMM 272 ALLENS AVE	**Lab Number:**	L1316180
Project Number:	METALS SCRAP YARD	**Report Date:**	08/28/13

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certificate/Approval Program Summary

Last revised August 3, 2012 – Mansfield Facility

The following list includes only those analytes/methods for which certification/approval is currently held.
For a complete listing of analytes for the referenced methods, please contact your Alpha Customer Service Representative.

Connecticut Department of Public Health Certificate/Lab ID: PH-0141.

Wastewater/Non-Potable Water (Inorganic Parameters: pH, Turbidity, Conductivity, Alkalinity, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, Total Residue (Solids), Total Suspended Solids (non-filterable). Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Acid Extractables, Benzidines, Phthalate Esters, Nitrosamines, Nitroaromatics & Isophorone, PAHs, Haloethers, Chlorinated Hydrocarbons, Volatile Organics.)

Solid Waste/Soil (Inorganic Parameters: pH, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Titanium, Vanadium, Zinc, Total Organic Carbon, Corrosivity, TCLP 1311, SPLP 1312. Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Volatile Organics, Acid Extractables, Benzidines, Phthalates, Nitrosamines, Nitroaromatics & Cyclic Ketones, PAHs, Haloethers, Chlorinated Hydrocarbons.)

Florida Department of Health Certificate/Lab ID: E87814. ***NELAP Accredited.***

Non-Potable Water (Inorganic Parameters: SM2320B, SM2540D, SM2540G.)

Solid & Chemical Materials (Inorganic Parameters: 6020, 7470, 7471, 9045. Organic Parameters: EPA 8260, 8270, 8082, 8081.)

Air & Emissions (EPA TO-15.)

Louisiana Department of Environmental Quality Certificate/Lab ID: 03090. ***NELAP Accredited.***

Non-Potable Water (Inorganic Parameters: EPA 180.1, 245.7, 1631E, 3020A, 6020A, 7470A, 9040, 9050A, SM2320B, 2540D, 2540G, 4500H-B, Organic Parameters: EPA 3510C, 3580A, 3630C, 3640A, 3660B, 3665A, 5030B, 8015D, 3570, 8081B, 8082A, 8260B, 8270C, 8270D.)

Solid & Chemical Materials (Inorganic Parameters: EPA 1311, 3050B, 3051A, 3060A, 6020A, 7196A, 7470A, 7471B, 7474, 9040B, 9045C, 9060. Organic Parameters: EPA 3540C, 3570, 3580A, 3630C, 3640A, 3660, 3665A, 5035, 8015D, 8081B, 8082A, 8260B, 8270C, 8270D.)

Biological Tissue (Inorganic Parameters: EPA 6020A. Organic Parameters: EPA 3570, 3510C, 3610B, 3630C, 3640A, 8270C, 8270D.)

Air & Emissions (EPA TO-15.)

New Hampshire Department of Environmental Services Certificate/Lab ID: 2206. ***NELAP Accredited.***

Non-Potable Water (Inorganic Parameters: EPA 180.1, 1631E, 6020A, 7470A, 9040B, 9050A, SM2540D, 2540G, 4500H+B, 2320B, 3020A, . Organic Parameters: EPA 3510C, 3630C, 3640A, 3660B, 8081B, 8082A, 8270C, 8270D, 8015D.)

Solid & Chemical Materials (Inorganic Parameters: SW-846 1311, 3050B, 3051A, 6020A, 7471B, 9040B, 9045C. Organic Parameters: SW-846 3540C, 3580A, 3630C, 3640A, 3660B, 3665A, 8270C, 8015D, 8082A, 8081B.)

New Jersey Department of Environmental Protection Certificate/Lab ID: MA015. ***NELAP Accredited.***

Non-Potable Water (Inorganic Parameters: SW-846 1312, 3020A, SM2320B, SM2540D, 2540G, 4500H-B, EPA 180.1, 1631E, SW-846 7470A, 9040C, 6020A, 9050A. Organic Parameters: SW-846 3510C, 3580A, 3630C, 3640A, 3660B, 3665A, 8015D, 8081B, 8082A, 8270C, 8270D)

Solid & Chemical Materials (Inorganic Parameters: SW-846 1311, 1312, 3050B, 3051A, 6020A, 7471B, 7474, 9040B, 9040C, 9045C, 9045D, 9060. Organic Parameters: SW-846 3540C, 3570, 3580A, 3630C, 3640A, 3660B, 3665A, 8081B, 8082A, 8270C, 8270D, 8015D.)

Atmospheric Organic Parameters (EPA 3C, TO-15, TO-10A, TO-13A-SIM.)

Biological Tissue (Inorganic Parameters: SW-846 6020A. Organic Parameters: SW-846 8270C, 8270D, 3510C, 3570, 3610C, 3630C, 3640A)

New York Department of Health Certificate/Lab ID: 11627. ***NELAP Accredited.***

Non-Potable Water (Inorganic Parameters: SM2320B, SM2540D, 6020A, 1631E, 7470A, 9050A, EPA 180.1, 3020A. Organic Parameters: EPA 8270C, 8270D, 8081B, 8082A, 3510C.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 6020A, 7471B, 7474, 9040C, 9045D. Organic Parameters: EPA 8270C, 8270D, 8081B, 8082A, 1311, 3050B, 3580A, 3570, 3051A.)

Air & Emissions (EPA TO-15, TO-10A.)

Pennsylvania Certificate/Lab ID: 68-02089 ***NELAP Accredited***

Non-Potable Water (Inorganic Parameters: 1312, 1631E, 180.1, 3020A, 6020A, 7470A, 9040B, 9050A, 2320B, 2540D, 2540G, SM4500H+-B. Organic Parameters: 3510C, 3580A, 3630C, 3640A, 3660B, 3665A, 8015D, 8081B, 8082A, 8270C, 8270D .)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1311, 3051A, 6020A, 7471B, 7474 9040B, 9045C, 9060. Organic Parameters: EPA3050B, 3540C, 3570, 3580A, 3630C, 3640A, 3660B, 3665A, 8270C, 8270D, 8081B, 8015D, 8082A.)

Rhode Island Department of Health Certificate/Lab ID: LAO00299. ***NELAP Accredited via NJ-DEP.***

Refer to NJ-DEP Certificate for Non-Potable Water.

Texas Commission of Environmental Quality Certificate/Lab ID: T104704419-08-TX. ***NELAP Accredited.***

Solid & Chemical Materials (Inorganic Parameters: EPA 6020, 7470, 7471, 1311, 9040, 9045, 9060. Organic Parameters: EPA 8015, 8270, 8081, 8082.)

Air (Organic Parameters: EPA TO-15)

Virginia Division of Consolidated Laboratory Services Certificate/Lab ID:460194. ***NELAP Accredited.***

Non-Potable Water (Inorganic Parameters:EPA 3020A, 6020A, 245.7, 9040B. Organic Parameters: EPA 3510C, 3640A, 3660B, 3665A, 8270C, 8270D, 8082A, 8081B, 8015D.)

Solid & Chemical Materials (Inorganic Parameters: EPA 6020A,7470A,7471B,9040B,9045C,3050B,3051, 9060. Organic Parameters: EPA 3540C, 3580A, 3630C, 3640A, 3660B, 3665A, 3570, 8270C, 8270D, 8081B, 8082A, 8015D.)

Washington State Department of Ecology Certificate/Lab ID: C954. *Non-Potable Water* (Inorganic Parameters: SM2540D, 180.1, 1631E.)

Solid & Chemical Materials (Inorganic Parameters: EPA 6020, 7470, 7471, 7474, 9045C, 9050A, 9060. Organic Parameters: EPA 8081, 8082, 8015, 8270.)

U.S. Army Corps of Engineers

Department of Defense, L-A-B Certificate/Lab ID: L2217.01.

Non-Potable Water (Inorganic Parameters: EPA 6020A, SM4500H-B. Organic Parameters: 3020A, 3510C, 8270C, 8270D, 8270C-ALK-PAH, 8270D-ALK-PAH, 8082A, 8081B, 8015D-SHC, 8015D.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1311, 3050B, 6020A, 7471A, 9045C, 9060, SM 2540G, ASTM D422-63. Organic Parameters: EPA 3580A, 3570, 3540C, 8270C, 8270D, 8270C-ALK-PAH, 8270D-ALK-PAH 8082A, 8081B, 8015D-SHC, 8015D.

Air & Emissions (EPA TO-15.)

STATE FORM - CHAIN OF CUSTODY PAGE 1 OF 1

Serial_No:08281314:16

ALPHA Job #: L1316180

Date Rec'd in Lab:

ALPHA
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: A Kelly Representing
Address: 200 Allens Ave
Site is 242 Allens Ave
Phone: Send Results to OccuHealth
Fax:
Email: results@occuhealth.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: 242 Allens Ave
Project Location: 242 Allens Ave
Project/PWS ID#: Metals Storage Yard
Project Manager: Dave Scarchilli
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due: Time:

Report Information - Data Deliverables

☐ FAX ☐ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client Info PO #:
OccuHealth Inc

Please Indicate PWS Class Below

☐ COM
☐ NTNC
☐ TNC

Other Project Specific Requirements/Comments/Detection Limits:

Very limited Sample #3 on ice at site. Send results to results@occuhealth.com

SAMPLES FOR POTENTIAL LITIGATION

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do

(PLEASE CHECK BELOW)

ALPHA Lab ID (Lab Use Only)	DEP Location Code	DEP Location Name	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: Full Metals Scan	Source(1) Multiple	Source(1) Single	Type Raw	Type Finished	Sample(2) Routine	Sample(2) Special	TOTAL # BOTTLES
L1316180-1	081613-1	Scrap pile #1	8/16/13	10:10	DirT	RT	✓							
2	081613-2	Scrap Pile #2	8/16/13	10:15	DirT	RT	✓							
3	081613-3	Scrap Pile #3	8/16/13	10:30	DirT	RT	✓							
4	081615-4	Scrap Pile #4	8/16/13	10:40	DirT	RT	✓							
	~~081613MS~~													
5	081613SWII	Shallow	8/16/13	10:47	DirT	RT	✓							
6	081613SSIII	Shredded Scrap	8/16/13	1050	DirT	RT	✓							
7	081613FEDS	Plate Structural	8/16/13	11 00	DirT	RT	✓							

Analysis: Total Dry weight, Screen PM10, PM-10 weight, Metals Scan of PM-10. SAVE Screened out Dirt. Call Robert Tuomanen.

(1) If Source is Multiple, please list connected sources
(2) If Sample type is special please explain

Container Type															
Preservative															

Relinquished By:	Date/Time	Received By:	Date/Time
Robert Tuomanen	8/16/13 12:40pm		8/16/13 12:40

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO 01-15 (rev. 16-NOV-10)

MANSFIELD CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
WESTBORO, MA — TEL. 508-898-9220 — FAX 508-898-9193
MANSFIELD, MA — TEL. 508-822-9300 — FAX 508-822-3288

Date Rec'd in Lab:

ALPHA Job #:

Client Information

Client: Occuhealth Inc
Address: 44 Wood Ave
Mansfield MA 02048
Phone: 508-339-9119
Fax:
Email: results@occuhealth.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: 200 Allens Ave
Project Location: Providence RI
Project #:
Project Manager: Dave Scarcelli
ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)
Date Due: RE: Time:

Report Information - Data Deliverables

☐ FAX ☑ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	Criteria

Other Project Specific Requirements/Comments/Detection Limits:
See Liz Portia

PLEASE NOTE
MS/MSD (at unit cost) will be omitted unless you check here: ☐

ANALYSIS: Full Metals Scan (except Se, Ag, Hg)

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Sample Specific Comments	TOTAL # BOTTLES
	200 AAR-1	8/22/13	11AM-PM	Wipe	RG	Results in mg/wipe	
	200 AAR-2	"	"	Wipe	RG	"	
	200 AAR-3	"	"	"	RG	"	
	200 AAR-4	"	"	"	RG	"	
	200 AAR-5	"	"	"	RG	"	
	200 AAR-6	"	"	"	RG	"	
	200 AAR-7	"	"	"	RG	"	
	200 AAR-8	"	"	"	RG	"	
	200 AA Field Blank	"	"	"	RG	"	

Container Type: G | | | | |
Preservative: | | | | |

Relinquished By:	Date/Time	Received By:	Date/Time
[illegible]	8/22/13 12:55	[illegible]	8/22/13 12:5

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will n start until any ambiguities are res All samples submitted are sub Alpha's Terms and Condition See reverse side.

MANSFIELD CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
WESTBORO, MA TEL. 508-898-9220 FAX. 508-898-9193
MANSFIELD MA TEL. 508-822-9300 FAX. 508-822-3288

Date Rec'd in Lab:

ALPHA Job #:

Client Information

Client: Occuhealth Inc

Address: 44 Wood Ave

Mansfield MA 02048

Phone: 508-339-9119

Fax:

Email: results@occuhealth.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: 200 Allens Ave

Project Location: Providence RI

Project #:

Project Manager: Dave Scarcelli

ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due: ASAP Time:

Report Information - Data Deliverables

☐ FAX ☑ EMAIL

☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	Criteria

Other Project Specific Requirements/Comments/Detection Limits:

See Liz Porta

PLEASE NOTE

MS/MSD (at unit cost) will be omitted unless you check here: ☐

ANALYSIS: Full Metals Scan (except Se, Ag, Hg)

SAMPLE HANDLING

Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Sample Specific Comments
	200 AAR-1	8/12/13	11:00-11:30	Wipe	RG	Results in ug/wipe
	200 AAR-2	"	"	Wipe	RG	"
	200 AAR-3	"	"	"	RG	"
	200 AAR-4	"	"	"	RG	"
	200-AAR-5	"	"	"	RG	"
	200 AAR-6	"	"	"	RG	"
	200 AAR-7	"	"	"	RG	"
	200 AAR-8	"	"	"	RG	"
	200 AA Field Blank	"	"	"	RG	"

Container Type																			
Preservative																			

Relinquished By:	Date/Time	Received By:	Date/Time
	8/13/13 12:55		8/13/13 12:5

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will n start until any ambiguities are res All samples submitted are sub Alpha's Terms and Condition See reverse side

FORM NO: 101-09 (rev. 27-SEP-10)

ALPHA ANALYTICAL

ANALYTICAL REPORT

Lab Number:	L1316508
Client:	OccuHealth 44 Wood Avenue Mansfield, MA 02048
ATTN:	Dave Scarchilli
Phone:	(508) 339-9119
Project Name:	200 ALLENS AVE
Project Number:	Not Specified
Report Date:	08/29/13

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), PA (68-02089), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), DOD (L2217.01), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1316508-01	200 AAR-1	PROVIDENCE, RI	08/22/13 11:00
L1316508-02	200 AAR-2	PROVIDENCE, RI	08/22/13 11:00
L1316508-03	200 AAR-3	PROVIDENCE, RI	08/22/13 11:00
L1316508-04	200 AAR-4	PROVIDENCE, RI	08/22/13 11:00
L1316508-05	200 AAR-5	PROVIDENCE, RI	08/22/13 11:00
L1316508-06	200 AAR-6	PROVIDENCE, RI	08/22/13 11:00
L1316508-07	200 AAR-7	PROVIDENCE, RI	08/22/13 11:00
L1316508-08	200 AAIW-8	PROVIDENCE, RI	08/22/13 11:00
L1316508-09	200 AAR FIELD BLANK	PROVIDENCE, RI	08/22/13 11:00

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples free of charge for 30 days from the date the project is completed. After 30 days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

Case Narrative (continued)

Sample Receipt

The element list for metals analysis was specified by the client.

Metals

L1316508-01 through -07 have elevated detection limits for all elements due to the dilutions required by matrix interferences encountered during analysis.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Cynthia McQueen

Title: Technical Director/Representative Date: 08/29/13

METALS

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

SAMPLE RESULTS

Lab ID:	L1316508-01	Date Collected:	08/22/13 11:00
Client ID:	200 AAR-1	Date Received:	08/22/13
Sample Location:	PROVIDENCE, RI	Field Prep:	Not Specified
Matrix:	Wipe		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	4000		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Antimony, Total	79		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Arsenic, Total	5.3		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Barium, Total	260		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Cadmium, Total	8.6		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Calcium, Total	7000		ug Abs	75	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Chromium, Total	100		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Cobalt, Total	13		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Copper, Total	290		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Iron, Total	38000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Lead, Total	390		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Magnesium, Total	1600		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Manganese, Total	350		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Nickel, Total	83		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Potassium, Total	670		ug Abs	620	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Silver, Total	ND		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Sodium, Total	590		ug Abs	500	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Vanadium, Total	16		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG
Zinc, Total	2500		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:28	EPA 3050B	1,6010C	MG

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

SAMPLE RESULTS

Lab ID:	L1316508-02	Date Collected:	08/22/13 11:00
Client ID:	200 AAR-2	Date Received:	08/22/13
Sample Location:	PROVIDENCE, RI	Field Prep:	Not Specified
Matrix:	Wipe		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	2700		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Antimony, Total	67		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Arsenic, Total	4.6		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Barium, Total	150		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Cadmium, Total	6.8		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Calcium, Total	4600		ug Abs	75	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Chromium, Total	110		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Cobalt, Total	12		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Copper, Total	370		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Iron, Total	42000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Lead, Total	450		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Magnesium, Total	1200		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Manganese, Total	390		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Nickel, Total	78		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Potassium, Total	ND		ug Abs	620	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Silver, Total	3.4		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Sodium, Total	ND		ug Abs	500	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Vanadium, Total	18		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG
Zinc, Total	1800		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:50	EPA 3050B	1,6010C	MG

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

SAMPLE RESULTS

Lab ID:	L1316508-03	Date Collected:	08/22/13 11:00
Client ID:	200 AAR-3	Date Received:	08/22/13
Sample Location:	PROVIDENCE, RI	Field Prep:	Not Specified
Matrix:	Wipe		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	4400		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Antimony, Total	62		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Arsenic, Total	ND		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Barium, Total	180		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Cadmium, Total	ND		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Calcium, Total	2600		ug Abs	75	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Chromium, Total	41		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Cobalt, Total	5.6		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Copper, Total	190		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Iron, Total	22000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Lead, Total	210		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Magnesium, Total	1600		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Manganese, Total	440		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Nickel, Total	27		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Potassium, Total	1600		ug Abs	620	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Silver, Total	ND		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Sodium, Total	520		ug Abs	500	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Vanadium, Total	15		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG
Zinc, Total	930		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:54	EPA 3050B	1,6010C	MG

Project Name: 200 ALLENS AVE
Project Number: Not Specified
Lab Number: L1316508
Report Date: 08/29/13

SAMPLE RESULTS

Lab ID: L1316508-04
Client ID: 200 AAR-4
Sample Location: PROVIDENCE, RI
Matrix: Wipe
Date Collected: 08/22/13 11:00
Date Received: 08/22/13
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	3700		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Antimony, Total	67		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Arsenic, Total	3.0		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Barium, Total	130		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Cadmium, Total	3.0		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Calcium, Total	2300		ug Abs	75	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Chromium, Total	56		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Cobalt, Total	5.8		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Copper, Total	380		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Iron, Total	26000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Lead, Total	240		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Magnesium, Total	1600		ug Abs	25	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Manganese, Total	230		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Nickel, Total	40		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Potassium, Total	1100		ug Abs	620	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Silver, Total	ND		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Sodium, Total	ND		ug Abs	500	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Vanadium, Total	17		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG
Zinc, Total	1200		ug Abs	12	--	5	08/27/13 14:40	08/28/13 18:57	EPA 3050B	1,6010C	MG

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

SAMPLE RESULTS

Lab ID:	L1316508-05	Date Collected:	08/22/13 11:00
Client ID:	200 AAR-5	Date Received:	08/22/13
Sample Location:	PROVIDENCE, RI	Field Prep:	Not Specified
Matrix:	Wipe		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	12000		ug Abs	25	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Antimony, Total	76		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Arsenic, Total	11		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Barium, Total	260		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Cadmium, Total	10		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Calcium, Total	5800		ug Abs	75	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Chromium, Total	200		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Cobalt, Total	22		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Copper, Total	800		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Iron, Total	87000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Lead, Total	780		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Magnesium, Total	4900		ug Abs	25	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Manganese, Total	840		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Nickel, Total	140		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Potassium, Total	2400		ug Abs	620	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Silver, Total	5.5		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Sodium, Total	570		ug Abs	500	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Vanadium, Total	53		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG
Zinc, Total	2900		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:01	EPA 3050B	1,6010C	MG

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

SAMPLE RESULTS

Lab ID: L1316508-06
Client ID: 200 AAR-6
Sample Location: PROVIDENCE, RI
Matrix: Wipe

Date Collected: 08/22/13 11:00
Date Received: 08/22/13
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	5000		ug Abs	25	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Antimony, Total	68		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Arsenic, Total	4.7		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Barium, Total	130		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Cadmium, Total	6.3		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Calcium, Total	2300		ug Abs	75	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Chromium, Total	78		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Cobalt, Total	9.4		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Copper, Total	370		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Iron, Total	34000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Lead, Total	380		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Magnesium, Total	2200		ug Abs	25	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Manganese, Total	370		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Nickel, Total	56		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Potassium, Total	1100		ug Abs	620	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Silver, Total	ND		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Sodium, Total	ND		ug Abs	500	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Vanadium, Total	24		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG
Zinc, Total	1900		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:04	EPA 3050B	1,6010C	MG

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

SAMPLE RESULTS

Lab ID:	L1316508-07	Date Collected:	08/22/13 11:00
Client ID:	200 AAR-7	Date Received:	08/22/13
Sample Location:	PROVIDENCE, RI	Field Prep:	Not Specified
Matrix:	Wipe		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	9200		ug Abs	25	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Antimony, Total	67		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Arsenic, Total	7.8		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Barium, Total	190		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	1.2	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Cadmium, Total	6.6		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Calcium, Total	4500		ug Abs	75	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Chromium, Total	140		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Cobalt, Total	15		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Copper, Total	660		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Iron, Total	64000		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Lead, Total	610		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Magnesium, Total	4200		ug Abs	25	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Manganese, Total	620		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Nickel, Total	99		ug Abs	6.2	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Potassium, Total	2200		ug Abs	620	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Silver, Total	4.4		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Sodium, Total	ND		ug Abs	500	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	5.0	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Vanadium, Total	41		ug Abs	2.5	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG
Zinc, Total	1900		ug Abs	12	--	5	08/27/13 14:40	08/28/13 19:08	EPA 3050B	1,6010C	MG

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

SAMPLE RESULTS

Lab ID:	L1316508-08	Date Collected:	08/22/13 11:00
Client ID:	200 AAIW-8	Date Received:	08/22/13
Sample Location:	PROVIDENCE, RI	Field Prep:	Not Specified
Matrix:	Wipe		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	1600		ug Abs	5.0	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Antimony, Total	67		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Arsenic, Total	1.8		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Barium, Total	99		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	0.25	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Cadmium, Total	5.8		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Calcium, Total	3500		ug Abs	15	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Chromium, Total	23		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Cobalt, Total	6.7		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Copper, Total	140		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Iron, Total	11000		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Lead, Total	150		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Magnesium, Total	720		ug Abs	5.0	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Manganese, Total	110		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Nickel, Total	18		ug Abs	1.2	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Potassium, Total	510		ug Abs	120	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Silver, Total	0.78		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Sodium, Total	670		ug Abs	100	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Vanadium, Total	7.2		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG
Zinc, Total	700		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:21	EPA 3050B	1,6010C	MG

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

SAMPLE RESULTS

Lab ID: L1316508-09
Client ID: 200 AAR FIELD BLANK
Sample Location: PROVIDENCE, RI
Matrix: Wipe

Date Collected: 08/22/13 11:00
Date Received: 08/22/13
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Westborough Lab											
Aluminum, Total	ND		ug Abs	5.0	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Antimony, Total	60		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Arsenic, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Barium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Beryllium, Total	ND		ug Abs	0.25	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Cadmium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Calcium, Total	ND		ug Abs	15	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Chromium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Cobalt, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Copper, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Iron, Total	2.9		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Lead, Total	ND		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Magnesium, Total	ND		ug Abs	5.0	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Manganese, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Nickel, Total	ND		ug Abs	1.2	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Potassium, Total	ND		ug Abs	120	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Selenium, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Silver, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Sodium, Total	ND		ug Abs	100	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Thallium, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Vanadium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG
Zinc, Total	ND		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 18:25	EPA 3050B	1,6010C	MG

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Westborough Lab for sample(s): 01-09 Batch: WG631929-1										
Aluminum, Total	ND		ug Abs	5.0	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Antimony, Total	ND		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Arsenic, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Barium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Beryllium, Total	ND		ug Abs	0.25	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Cadmium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Calcium, Total	ND		ug Abs	15	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Chromium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Cobalt, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Copper, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Iron, Total	ND		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Lead, Total	ND		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Magnesium, Total	ND		ug Abs	5.0	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Manganese, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Nickel, Total	ND		ug Abs	1.2	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Potassium, Total	ND		ug Abs	120	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Selenium, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Silver, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Sodium, Total	ND		ug Abs	100	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Thallium, Total	ND		ug Abs	1.0	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Vanadium, Total	ND		ug Abs	0.50	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG
Zinc, Total	ND		ug Abs	2.5	--	1	08/27/13 14:40	08/28/13 16:21	1,6010C	MG

Prep Information

Digestion Method: EPA 3050B

Lab Control Sample Analysis
Batch Quality Control

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-09 Batch: WG631929-2 WG631929-3								
Aluminum, Total	100		90		29-171	11		
Antimony, Total	100		98		4-196	2		
Arsenic, Total	100		100		81-119	0		
Barium, Total	95		90		83-118	5		
Beryllium, Total	98		94		83-117	4		
Cadmium, Total	100		96		82-117	4		
Calcium, Total	94		92		83-117	2		
Chromium, Total	100		95		80-119	5		
Cobalt, Total	98		96		83-117	2		
Copper, Total	100		96		83-117	4		
Iron, Total	96		91		51-150	5		
Lead, Total	96		94		80-120	2		
Magnesium, Total	99		97		74-126	2		
Manganese, Total	94		92		83-117	2		
Nickel, Total	98		94		82-117	4		
Potassium, Total	96		93		74-126	3		
Selenium, Total	100		100		80-120	0		
Silver, Total	100		97		66-134	3		
Sodium, Total	96		94		74-127	2		
Thallium, Total	100		92		79-120	8		
Vanadium, Total	100		98		79-121	2		

Lab Control Sample Analysis
Batch Quality Control

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-09 Batch: WG631929-2 WG631929-3					
Zinc, Total	96	94	82-119	2	

Project Name: 200 ALLENS AVE
Project Number: Not Specified

Lab Number: L1316508
Report Date: 08/29/13

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1316508-05A	Amber 100ml unpreserved	A	N/A	8.4	Y	Absent	BE-TI(180),AS-TI(180),BA-TI(180),AG-TI(180),AL-TI(180),CR-TI(180),NI-TI(180),TL-TI(180),CU-TI(180),PB-TI(180),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),V-TI(180),FE-TI(180),MG-TI(180),MN-TI(180),CA-TI(180),CD-TI(180),K-TI(180),NA-TI(180)
L1316508-06A	Amber 100ml unpreserved	A	N/A	8.4	Y	Absent	BE-TI(180),AS-TI(180),BA-TI(180),AG-TI(180),AL-TI(180),CR-TI(180),NI-TI(180),TL-TI(180),CU-TI(180),PB-TI(180),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),V-TI(180),FE-TI(180),MG-TI(180),MN-TI(180),CA-TI(180),CD-TI(180),K-TI(180),NA-TI(180)
L1316508-07A	Amber 100ml unpreserved	A	N/A	8.4	Y	Absent	BE-TI(180),AS-TI(180),BA-TI(180),AG-TI(180),AL-TI(180),CR-TI(180),NI-TI(180),TL-TI(180),CU-TI(180),PB-TI(180),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),V-TI(180),FE-TI(180),MG-TI(180),MN-TI(180),CA-TI(180),CD-TI(180),K-TI(180),NA-TI(180)
L1316508-08A	Amber 100ml unpreserved	A	N/A	8.4	Y	Absent	BE-TI(180),AS-TI(180),BA-TI(180),AG-TI(180),AL-TI(180),CR-TI(180),NI-TI(180),TL-TI(180),CU-TI(180),PB-TI(180),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),V-TI(180),FE-TI(180),MG-TI(180),MN-TI(180),CA-TI(180),CD-TI(180),K-TI(180),NA-TI(180)
L1316508-09A	Amber 100ml unpreserved	A	N/A	8.4	Y	Absent	BE-TI(180),AS-TI(180),BA-TI(180),AG-TI(180),AL-TI(180),CR-TI(180),NI-TI(180),TL-TI(180),CU-TI(180),PB-TI(180),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),V-TI(180),FE-TI(180),MG-TI(180),MN-TI(180),CA-TI(180),CD-TI(180),K-TI(180),NA-TI(180)

*Values in parentheses indicate holding time in days

Project Name: 200 ALLENS AVE
Project Number: Not Specified
Lab Number: L1316508
Report Date: 08/29/13

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit. This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report

Project Name:	200 ALLENS AVE	**Lab Number:**	L1316508
Project Number:	Not Specified	**Report Date:**	08/29/13

Data Qualifiers

M	- Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
NJ	- Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
P	- The RPD between the results for the two columns exceeds the method-specified criteria.
Q	- The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
R	- Analytical results are from sample re-analysis.
RE	- Analytical results are from sample re-extraction.
S	- Analytical results are from modified screening analysis.
J	- Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
ND	- Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name: 200 ALLENS AVE
Project Number: Not Specified
Lab Number: L1316508
Report Date: 08/29/13

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certificate/Approval Program Summary

Last revised August 29, 2013 - Westboro Facility

The following list includes only those analytes/methods for which certification/approval is currently held.
For a complete listing of analytes for the referenced methods, please contact your Alpha Customer Service Representative.

Connecticut Department of Public Health Certificate/Lab ID: PH-0574. ***NELAP Accredited Solid Waste/Soil.***

Drinking Water (Inorganic Parameters: Color, pH, Turbidity, Conductivity, Alkalinity, Chloride, Free Residual Chlorine, Fluoride, Calcium Hardness, Sulfate, Nitrate, Nitrite, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Selenium, Silver, Sodium, Thallium, Zinc, Total Dissolved Solids, Total Organic Carbon, Total Cyanide, Perchlorate. Organic Parameters: Volatile Organics 524.2, Total Trihalomethanes 524.2, 1,2-Dibromo-3-chloropropane (DBCP) 504.1, Ethylene Dibromide (EDB) 504.1, 1,4-Dioxane (Mod 8270). Microbiology Parameters: Total Coliform-MF mEndo (SM9222B), Total Coliform – Colilert (SM9223, Enumeration and P/A), E. Coli. – Colilert (SM9223, Enumeration and P/A), HPC – Pour Plate (SM9215B), Fecal Coliform – MF m-FC (SM9222D), Fecal Coliform-EC Medium (SM 9221E).

Wastewater/Non-Potable Water (Inorganic Parameters: Color, pH, Conductivity, Acidity, Alkalinity, Chloride, Total Residual Chlorine, Fluoride, Total Hardness, Silica, Sulfate, Sulfide, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, O-Phosphate, Total Phosphorus, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, Total Residue (Solids), Total Dissolved Solids, Total Suspended Solids (non-filterable), BOD, CBOD, COD, TOC, Total Cyanide, Phenolics, Foaming Agents (MBAS), Bromide, Oil and Grease. Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Acid Extractables (Phenols), Benzidines, Phthalate Esters, Nitrosamines, Nitroaromatics & Isophorone, Polynuclear Aromatic Hydrocarbons, Haloethers, Chlorinated Hydrocarbons, Volatile Organics, TPH (HEM/SGT), CT-Extractable Petroleum Hydrocarbons (ETPH), MA-EPH, MA-VPH. Microbiology Parameters: Total Coliform – MF mEndo (SM9222B), Total Coliform – MTF (SM9221B), E. Coli – Colilert (SM9223 Enumeration), HPC – Pour Plate (SM9215B), Fecal Coliform – MF m-FC (SM9222D), Fecal Coliform – A-1 Broth (SM9221E), Enterococcus - Enterolert.

Solid Waste/Soil (Inorganic Parameters: pH, Sulfide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Vanadium, Zinc, Total Cyanide, Ignitability, Phenolics, Corrosivity, TCLP Leach (1311), SPLP Leach (1312 metals only), Reactivity. Organic Parameters: PCBs, PCBs in Oil, Organochlorine Pesticides, Technical Chlordane, Toxaphene, CT-Extractable Petroleum Hydrocarbons (ETPH), MA-EPH, MA-VPH, Dicamba, 2,4-D, 2,4,5-T, 2,4,5-TP(Silvex), Dalapon, Volatile Organics (SW 8260), Acid Extractables (Phenols) (SW 8270), Benzidines (SW 8270), Phthalates (SW 8270), Nitrosamines (SW 8270), Nitroaromatics & Cyclic Ketones (SW 8270), PAHs (SW 8270), Haloethers (SW 8270), Chlorinated Hydrocarbons (SW 8270).)

State of Illinois Certificate/Lab ID: 003155. ***NELAP Accredited.***
Drinking Water (Inorganic Parameters: SM2120B, 2320B, 2510B, 2540C, SM4500CN-CE, 4500F-C, 4500H-B, 4500NO3-F, 5310C, EPA 200.7, 200.8, 245.1, 300.0. Organic Parameters: EPA 504.1, 524.2.)

Wastewater/Non-Potable Water (Inorganic Parameters: SM2120B, 2310B, 2320B, 2340B, 2510B, 2540B, 2540C, 2540D, SM4500CL-E, 4500CN-E, 4500F-C, 4500H-B, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500P-E, 4500S-D, 4500SO3-B, 5210B, 5220D, 5310C, 5540C, EPA 120.1, 1664A, 200.7, 200.8, 245.1, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1. Organic Parameters: EPA 608, 624, 625.)

Hazardous and Solid Waste (Inorganic Parameters: EPA 1010A, 1030, 1311, 1312, 6010C, 6020A, 7196A, 7470A, 7471B, 9012B, 9014, 9038, 9040C, 9045D, 9050A, 9065, 9251. Organic Parameters: 8011 (NPW only), 8015C, 8081B, 8082A, 8151A, 8260C, 8270D, 8315A, 8330.)

Maine Department of Human Services Certificate/Lab ID: 2009024.
Drinking Water (Inorganic Parameters: SM9215B, 9222D, 9223B, EPA 180.1, 353.2, SM2120B, 2130B, 2320B, 2510C, 2540C, 4500Cl-D, 4500CN-C, 4500CN-E, 4500F-C, 4500H+B, 4500NO3-F, 5310C, EPA 200.7, EPA 200.8, 245.1, EPA 300.0. Organic Parameters: 504.1, 524.2.)

Wastewater/Non-Potable Water (Inorganic Parameters: EPA 120.1, 1664A, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1, 8315A, 9010C, SM2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 426C, 4500Cl-E, 4500CN-C, 4500CN-E, 4500F-B, 4500F-C, 4500H+B, 4500Norg-C, 4500NH3-B, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500P-B, 4500P-E, 4500S2-D, 4500SO3-B, 5540C, 5210B, 5220D, 5310C, 9010B, 9030B, 9040C, 7470A, 7196A, 2340B, EPA 200.7, 6010C, 200.8, 6020A, 245.1, 1311, 1312, 3005A, Enterolert, 9223B, 9222D. Organic Parameters: 608, 624, 625, 8011, 8081B, 8082A, 8330, 8151A, 8260C, 8270D, 3510C, 3630C, 5030B, ME-DRO, ME-GRO, MA-EPH, MA-VPH.)

Solid Waste/Soil (Inorganic Parameters: 9010B, 9012A, 9014, 9040B, 9045C, 6010C, 6020A, 7471B, 7196A, 9050A, 1010, 1030, 9065, 1311, 1312, 3005A, 3050B, 9038, 9251. Organic Parameters: ME-DRO, ME-GRO, MA-EPH, MA-VPH, 8260C, 8270D, 8330, 8151A, 8081B, 8082A, 3540C, 3546, 3580A, 3620C, 3630C, 5030B, 5035.)

Massachusetts Department of Environmental Protection Certificate/Lab ID: M-MA086.
Drinking Water (Inorganic Parameters: (EPA 200.8 for: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl) (EPA 200.7 for: Ba,Be,Ca,Cd,Cr,Cu,Na,Ni) 245.1, (300.0 for: Nitrate-N, Fluoride, Sulfate); (EPA 353.2 for: Nitrate-N, Nitrite-N); (SM4500NO3-F for: Nitrate-N and Nitrite-N); 4500F-C, 4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, 2320B, SM2540C, SM4500H-B. Organic Parameters: (EPA 524.2 for: Trihalomethanes, Volatile Organics); (504.1 for: 1,2-Dibromoethane, 1,2-Dibromo-3-Chloropropane), EPA 332. Microbiology Parameters: SM9215B; ENZ. SUB. SM9223; ColilertQT SM9223B; MF-SM9222D.)

Non-Potable Water (Inorganic Parameters:, (EPA 200.8 for: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn); (EPA 200.7 for: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Tl,Tl,V,Zn); 245.1, SM4500H,B, EPA 120.1, SM2510B, 2540C, 2340B, 2320B, 4500CL-E, 4500F-BC, 426C, SM4500NH3-BH, (EPA 350.1 for: Ammonia-N), LACHAT 10-107-06-1-B for Ammonia-N, SM4500NO3-F, 353.2 for Nitrate-N, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, 4500P-B,E, 5220D, EPA 410.4, SM 5210B, 5310C, 4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.
Organic Parameters: (EPA 624 for Volatile Halocarbons, Volatile Aromatics),(608 for: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT,Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs-Water), (EPA 625 for SVOC Acid Extractables and SVOC Base/Neutral Extractables), 600/4-81-045-PCB-Oil. Microbiology Parameters: (ColilertQT SM9223B; Enterolert-QT: SM9222D-MF.)

New Hampshire Department of Environmental Services Certificate/Lab ID: 200307. ***NELAP Accredited.***
Drinking Water (Inorganic Parameters: SM 9222B, 9223B, 9215B, EPA 200.7, 200.8, 300.0, SM4500CN-E, 4500H+B, 4500NO3-F, 2320B, 2510B, 2540C, 4500F-C, 5310C, 2120B, EPA 332.0. Organic Parameters: 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: SM9222D, 9221B, 9222B, 9221E-EC, EPA 3005A, 200.7, 200.8, 245.1, SW-846 6010C, 6020A, 7196A, 7470A, SM3500-CR-D, EPA 120.1, 300.0, 350.1, 350.2, 351.1, 353.2, 410.4, 420.1, 426C, 1664A, SW-846 9010B, 9010C, 9030, 9040B, 9040C, SM2120B, 2310B, 2320B, 2340B, 2540B, 2540D, 4500H+B, 4500CL-E, 4500CN-E, 4500NH3-H, 4500NO3-F, 4500NO2-B, 4500P-E, 4500-S2-D, 4500SO3-B, 5210B, 5220D, 2510B, 2540C, 4500F-C, 5310C, 5540C, LACHAT 10-204-00-1-A, LACHAT 10-107-06-2-D, 3060A. Organic Parameters: SW-846 3510C, 3630C, 5030B, 8260C, 8270D, 8330, EPA 624, 625, 608, SW-846 8082A, 8081B, 8015C, 8151A, 8330, 8270D-SIM.)

Solid & Chemical Materials (Inorganic Parameters: SW-846 6010C, 6020A, 7196A, 7471B, 1010, 1010A, 1030, 9010C, 9012B, 9014, 9030B, 9040C, 9045C, 9045D, 9050, 9065, 9251, 1311, 1312, 3005A, 3050B, 3060A. Organic Parameters: SW-846 3540C, 3546, 3050B, 3580A, 3620D, 3630C, 5030B, 5035, 8260C, 8270D, 8270D-SIM, 8330, 8151A, 8015B, 8015C, 8082A, 8081B.)

New Hampshire Department of Environmental Services Certificate/Lab ID: 2064. ***NELAP Accredited.***
Drinking Water (Organic Parameters: **EPA 524.2:** Di-isopropyl ether (DIPE), Ethyl-t-butyl ether (ETBE), Tert-amyl methyl ether (TAME)).

Non-Potable Water (Organic Parameters: **EPA 8260C:** 1,3,5-Trichlorobenzene. **EPA 8015C(M):** TPH.)

Solid & Chemical Materials (Organic Parameters: **EPA 8260C:** 1,3,5-Trichlorobenzene.)

New Jersey Department of Environmental Protection Certificate/Lab ID: MA935. ***NELAP Accredited.***
Drinking Water (Inorganic Parameters: SM9222B, 9221E, 9223B, 9215B, 4500CN-CE, 4500NO3-F, 4500F-C, EPA 300.0, 200.7, 200.8, 245.1, 2540C, SM2120B, 2320B, 2510B, 5310C, SM4500H-B. Organic Parameters: EPA 332, 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: SM5210B, EPA 410.4, SM5220D, 4500Cl-E, EPA 300.0, SM2120B, 2340B, SM4500F-BC, EPA 200.7, 200.8, 351.1, LACHAT 10-107-06-2-D, EPA 353.2, SM4500NO3-F, 4500NO2-B, EPA 1664A, SM5310B, C or D, 4500-PE, EPA 420.1, SM510ABC, SM4500P-B5+E, 2540B, 2540C, 2540D, EPA 120.1, SM2510B, SM15 426C, 9222D, 9221B, 9221C, 9221E, 9222B, 9215B, 2310B, 2320B, 4500NH3-H, 4500-S D, EPA 350.1, 350.2, SW-846 1312, 7470A, 5540C, SM4500H-B, 4500SO3-B, SM3500Cr-D, 4500CN-CE, EPA 245.1, SW-846 9040B, 9040C, 3005A, 3015, EPA 6010B, 6010C, 6020, 6020A, 7196A, 3060A, SW-846 9010C, 9030B. Organic Parameters: SW-846 8260B, 8260C, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 3510C, EPA 608, 624, 625, SW-846 3630C, 5030B, 8011, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8330, 1,4-Dioxane by NJ Modified 8270, 8015B, NJ EPH.)

Solid & Chemical Materials (Inorganic Parameters: SW-846, 6010B, 6010C, 6020, 6020A, 7196A, 3060A, 9030B, 1010, 1010A, 1030, 1311, 1312, 3005A, 3050B, 7471A, 7471B, 9010C, 9012B, 9014, 9038, 9040B, 9040C, 9045C, 9045D,

9050A, 9065, 9251. Organic Parameters: SW-846 8015B, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8330, 8260B, 8260C, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 3540C, 3546, 3580A, 3620C, 3630C, 5030B, 5035L, 5035H, NJ EPH.)

New York Department of Health Certificate/Lab ID: 11148. ***NELAP Accredited.***
Drinking Water (Inorganic Parameters: SM9223B, 9222B, 9215B, EPA 200.8, 200.7, 245.1, SM5310C, EPA 332.0, SM2320B, EPA 300.0, SM2120B, 4500CN-E, 4500F-C, 4500NO3-F, 2540C, SM 2510B. Organic Parameters: EPA 524.2, 504.1.)

Non-Potable Water (Inorganic Parameters: SM9221E, 9222D, 9221B, 9222B, 9215B, 5210B, 5310C, EPA 410.4, SM5220D, 2310B, 2320B, EPA 200.7, 300.0, SM4500CL-E, 4500F-C, SM15 426C, EPA 350.1, SM4500NH3-BH, EPA 351.1, LACHAT 10-107-06-2, EPA 353.2, SM4500-NO3-F, 4500-NO2-B, 4500P-E, 2340B, 2540C, 2540B, 2540D, EPA 200.8, EPA 6010C, 6020A, EPA 7196A, SM3500Cr-D, EPA 245.1, 7470A, SM2120B, 4500CN-CE, EPA 1664A, EPA 420.1, SM14 510C, EPA 120.1, SM2510B, SM4500S-D, SM5540C, EPA 8315A, 3005A, 3015, 9010C, 9030B. Organic Parameters: EPA 624, 8260C, 8270D, 8270D-SIM, 625, 608, 8081B, 8151A, 8330, 8082A, EPA 3510C, 5030B, 8015C, 8011.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1010A, 1030, EPA 6010C, 6020A, 7196A, 7471B, 8315A, 9012B, 9014, 9065, 9050A, 9038, 9251, EPA 1311, 1312, 3005A, 3050B, 9010C, 9030B, 9040C, 9045D. Organic Parameters: EPA 8260C, 8270D, 8270D-SIM, 8015C, 8081B, 8151A, 8330, 8082A, 3540C, 3546, 3580A, 5035A-H, 5035A-L.)

North Carolina Department of the Environment and Natural Resources Certificate/Lab ID: 666. (Inorganic Parameters: SM2310B, 2320B, 4500Cl-E, 4500Cn-E, 9012B, 9014, Lachat 10-204-00-1-X, 1010A, 1030, 4500NO3-F, 353.2, 4500P-E, 4500SO4-E, 300.0, 4500S-D, 5310B, 5310C, 6010C, 6020A, 200.7, 200.8, 3500Cr-B, 7196A, 245.1, 7470A, 7471B, 1311,1312. Organic Parameters: 608, 8081B, 8082A, 624, 8260B, 625, 8270D, 8151A, 8015C, 504.1, MA-EPH, MA-VPH.)

Drinking Water Program Certificate/Lab ID: 25700. (Inorganic Parameters: Chloride EPA 300.0. Organic Parameters: 524.2)

Pennsylvania Department of Environmental Protection Certificate/Lab ID: 68-03671. ***NELAP Accredited.***
Drinking Water (Inorganic Parameters: 200.7, 200.8, 300.0, 332.0, 2120B, 2320B, 2510B, 2540C, 4500-CN-CE, 4500F-C, 4500H+-B, 4500NO3-F, 5310C. Organic Parameters: EPA 524.2, 504.1)

Non-Potable Water (Inorganic Parameters: EPA 120.1, 1312, 3005A,3015, 3060A, 200.7, 200.8, 410.4, 1664A, SM2540D, 5210B, 5220D, 4500-P,BE, 245.1, 300.0, 350.1, 350.2, 351.1, 353.2, 420.1, 6010C, 6020A, 7196A, 7470A, 9030B, 2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 3500Cr-D, 426C, 4500CN-CE, 4500Cl-E, 4500F-B, 4500F-C, 4500H+-B, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500S-D, 4500SO3-B, 5310BCD, 5540C, 9010C, 9040C. Organic Parameters: EPA 3510C, 3630C, 5030B, 625, 624, 608, 8081B, 8082A, 8151A, 8260C, 8270D, 8270D-SIM, 8330, 8015C, NJ-EPH.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 350.1, 1010, 1030, 1311, 1312, 3005A, 3050B, 3060A, 6010C, 6020A, 7196A, 7471B, 9010C, 9012B, 9014, 9040B, 9045D, 9050A, 9065, SM 4500NH3-BH, 9030B, 9038, 9251. Organic Parameters: 3540C, 3546, 3580A, 3620C, 3630C, 5035, 8015C, 8081B, 8082A, 8151A, 8260C, 8270D, 8270D-SIM, 8330, NJ-EPH.)

Rhode Island Department of Health Certificate/Lab ID: LAO00065. ***NELAP Accredited via NJ-DEP.***
Refer to MA-DEP Certificate for Potable and Non-Potable Water.
Refer to NJ-DEP Certificate for Potable and Non-Potable Water.

Texas Commisson on Environmental Quality Certificate/Lab ID: T104704476. ***NELAP Accredited.***
Non-Potable Water (Inorganic Parameters: EPA 120.1, 1664, 200.7, 200.8, 245.1, 245.2, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1, 6010, 6020, 7196, 7470, 9040, SM 2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 426C, 4500CL-E, 4500CN-E, 4500F-C, 4500H+B, 4500NH3-H, 4500NO2B, 4500P-E, 4500 $S2^-$ D, 510C, 5210B, 5220D, 5310C, 5540C. Organic Parameters: EPA 608, 624, 625, 8081, 8082, 8151, 8260, 8270, 8330.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1311, 1312, 9012, 9014, 9040, 9045, 9050, 9065.)

Virginia Division of Consolidated Laboratory Services Certificate/Lab ID: 460195. ***NELAP Accredited.***
Drinking Water (Inorganic Parameters: EPA 200.7, 200.8, 300.0, 2510B, 2120B, 2540C, 4500CN-CE, 245.1, 2320B, 4500F-C, 4500NO3-F, 4500H+B, 5310C. Organic Parameters: EPA 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: EPA 120.1, 1664A, 200.7, 200.8, 245.1, 300.0, 350.1, 351.1, 351.2, 3005A, 3015, 1312, 6010B, 6010C, 3060A, 353.2, 420.1, 2340B, 6020, 6020A, SM4500S-D, SM4500-CN-CE, Lachat 10-204-00-1-X, 7196A, 7470A, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 3500Cr-D, 426C, 4500Cl-E, 4500F-B, 4500F-C, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500 SO3-B, 4500H-B, 4500PE, 510AC, 5210B, 5310B 5310C, 5540C, 9010Cm

9030B, 9040C. Organic Parameters: EPA 3510C, 3630C, 5030B, 8260B, 608, 624, 625, 8011, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8260C, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 8330,)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1010A, 1030, 3060A, 3050B, 1311, 1312, 6010B, 6010C, 6020, , 7196A, 7471A, 7471B, 6020A, 9010C, 9012B, 9030B, 9014, 9038, 9040C, 9045D, 9251, 9050A, 9065. Organic Parameters: EPA 5030B, 5035, 3540C, 3546, 3550B, 3580A, 3620C, 3630C, 6020A, 8260B, 8260C, 8015B, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 8330.)

Department of Defense, L-A-B Certificate/Lab ID: L2217.
Drinking Water (Inorganic Parameters: SM 4500H-B. Organic Parameters: EPA 524.2, 504.1.)

Non-Potable Water (Inorganic Parameters: EPA 200.7, 200.8, 6010C, 6020A, 245.1, 7470A, 9040B, 9010B, 180.1, 300.0, 332.0, 6860, 351.1, 353.2, 9060, 1664A, SM 4500CN-E, 4500H-B, 4500Norg-C, 4500NO3-F, 5310C, 2130B, 2320B, 2340B, 2540C, 5540C, 3005A, 3015, 9056, 7196A, 3500-Cr-D. Organic Parameters: EPA 8015C, 8151A, 8260C, 8270D, 8270D-SIM, 8330A, 8082A, 8081B, 3510C, 5030B, MassDEP EPH, MassDEP VPH.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 200.7, 6010C, 6020A, 7471A, 6860, 1311, 1312, 3050B, 7196A, 9040B, 9045C, 9010C, 9012B, 9251, SM3500-CR-D, 4500CN-CE, 2540G, Organic Parameters: EPA 8015C, 8151A, 8260C, 8270D, 8270D-SIM, 8330A/B-prep, 8082A, 8081B, 3540C, 3546, 3580A, 5035A, MassDEP EPH, MassDEP VPH.)

The following analytes are not included in our current NELAP/TNI Scope of Accreditation:
EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether. **EPA 8260B:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene. **EPA 8260 Non-potable water matrix:** Iodomethane (methyl iodide), Methyl methacrylate. **EPA 8260 Soil matrix:** Tert-amyl methyl ether (TAME), Diisopropyl ether (DIPE), Azobenzene. **EPA 8330A:** PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT. **EPA 8270C:** Methyl naphthalene, Dimethyl naphthalene, Total Methylnapthalenes, Total Dimethylnaphthalenes, 1,4-Diphenylhydrazine. **EPA 625:** 4-Chloroaniline, 4-Methylphenol. Total Phosphorus in a soil matrix, TKN in a soil matrix, NO2 in a soil matrix, NO3 in a soil matrix. **EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

MAK Law Firm
Attn: Mr. Greg Butler
128 Dorrance Street
Providence, RI 02903

Date Received: 5/15/2013
Date Reported: 5/22/2013
P.O. #:
Work Order #: 1305-10126

DESCRIPTION: 200 ALLENS AVE

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.
The Certificate of Analysis shall not be reproduced except in full, without written approval of R.I. Analytical.
Results relate only to samples submitted to the laboratory for analysis.
Test results are not blank corrected.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Sharon Baker
MIS / Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

250

MAK Law Firm
Date Received: 5/15/2013
Work Order #: 1305-10126

Sample # 001
SAMPLE DESCRIPTION: 200 ALLENS AVE
SAMPLE TYPE: GRAB SAMPLE DATE/TIME: 5/06/2013

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE/TIME ANALYZED	ANALYST
Hexavalent Chromium	<1.0	1.0	mg/kg dry	SW-846 7196A	5/17/2013 15:45	PIT
Total Metals Analyzed by ICP						
Cadmium	19	0.25	mg/kg dry	SW-846 6010	5/16/2013 19:01	PJC
Iron	110000	100	mg/kg dry	SW-846 6010	5/16/2013 19:01	PJC
Lead	1100	2.0	mg/kg dry	SW-846 6010	5/16/2013 19:01	PJC
Mercury	2.3	1.0	mg/kg dry	SW-846 7471A	5/17/2013 10:12	PJC
ICP Digestion				SW-846 3050	5/15/2013 23:27	OMC
Mercury Digestion	Digested			SW-846 7471A	5/17/2013 8:35	JL
Moisture	2		%	SM2540 G	5/15/2013 20:18	OMC

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type [C]	Preservation Code [P]	Matrix Code [M]	Hexavalent Chromium	Cadmium	Lead	Mercury	Trace Cr circle *
5/10/13		200 ALLENS AVE	C	1B	P	B	X	X	X	X	X

Client Information

Company Name: MAK LAW FIRM
Address: 128 Dorrance Street
City / State / Zip: Providence RI
Telephone: 1-401-490-7354 Fax:
Contact Person: Greg Butler

Project Information

Project Name:
P.O. Number: Project Number:
Report To: Phone: Fax
Sampled By: Email report to these addresses:
Quote No:

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
[signature]	5/15/13	11.00 AM	[signature]	5/15/13	11:00

Turn Around Time

X Normal | EMAIL Report
5 Business days. Possible surcharge
Rush – Date Due: ___/___/___

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, S-1, S-2, S-3 MCP Data Enhancement QC Package? Yes No

PAID $146.00 CHECK # 4489

* IRON ONLY PER K. MAYO. - NOT IRON-OXIDE

Temp. Upon Receipt Amb °C

Lab Use Only

- Sample Pick-Up Only
- RIAL sampled; attach field hours
- Shipped on ice

Workorder No: 305-1026

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH4Cl, H=HCl, M=MeOH, N=HNO3, NP=None, S=H2SO4, SB=NaHSO4, SH=NaOH, T=Na2S2O3, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

K

OSHA® BRIEF

Medical Evaluation of Renal Effects of Cadmium Exposures

This Brief will help physicians understand the medical surveillance provisions of the Cadmium standard (29 CFR 1910.1027 for general industry; 29 CFR 1926.1127 for the construction industry; 29 CFR 1915.1027 for the shipyard industry; and 29 CFR 1928.1027 for the agriculture industry), especially those provisions that address the renal effects of cadmium, and supplements the Cadmium Biological Monitoring Advisor eTool. General background information on cadmium (Cd) is available on the Health and Safety Topics page at OSHA's web site (www.osha.gov/SLTC/cadmium/index.html).

Occupational Exposure to Cadmium Can Result in Possible Kidney Damage

Occupational exposure to cadmium can result in serious kidney damage (renal tubular proteinuria). All workers who are working in conditions that may place them at high risk of elevated cadmium exposure, including levels at or above the current action level of 2.5 $\mu g/m^3$, must be evaluated under a medical surveillance program.

The Importance of Medical Surveillance

The medical surveillance provisions of the Cadmium standard (i.e., paragraph (l)) aim to accomplish three main interrelated purposes: (1) identifying workers who may be at increased risk of adverse renal effects from chronic exposure to cadmium; (2) preventing cadmium-induced renal disease; and (3) detecting and minimizing existing cadmium-induced disease. To accomplish these goals, periodic biologic monitoring of three key biological indicators (cadmium in blood – CdB, cadmium in urine – CdU, and beta-2-microglobulin in urine – β_2MU) is included in the medical surveillance provisions. If the employee's biological monitoring results are above normal levels, the employer must take additional actions, which may include, but are not limited to, more frequent medical surveillance.

Each biological measurement provides distinct information about hazardous exposures:

- Levels of cadmium in the blood are associated with recent exposures to Cd. They are measured as micrograms of Cd per liter of whole blood (CdB µg per lwb; reported as units of CdB);
- Cadmium body burden in the kidney is associated with long-term elevated exposures to cadmium in the air. It is measured as micrograms of Cd per gram of creatinine in urine (CdU µg per grCr; reported as units of CdU); and
- Potential and actual kidney damage is identified using elevated beta-2-microglobulin levels in urine. It is measured as micrograms of beta-2-microglobulin (β_2M) per gram of creatinine in urine (β_2M µg per grCrU; reported as units of β_2MU). β_2M is a small molecular weight protein in urine.

Using Biological Measurements during Medical Surveillance

The levels of biological measurements noted above indicate greater and lesser risk of contracting cadmium-induced renal disease (renal tubular proteinuria), and provide triggers for appropriate medical responses. The medical surveillance section (29 CFR 1910.1027(l)) of the Cadmium standard identifies elevated levels of these measurements that will alert the physician and the employee that the employee is at increased risk of kidney dysfunction. The medical surveillance section specifies clear triggers for non-mandatory and mandatory medical actions regarding the disposition of workers with elevated measurement levels. Table 1 of this Brief, below, describes the initial non-mandatory and mandatory actions with regarding to various elevated levels of these measurements.

Table 1. Medical Removal Actions Triggered by Initial Medical Surveillance (1910.1027(l))[1]

Biological Measurement	Normal Levels	Elevated Levels, Non-Mandatory Removal	Highly Elevated Levels, Non-Mandatory Removal	Highly Elevated Levels, Mandatory Removal
Cadmium in urine (CdU)[2]	≤ 3	> 3 and ≤ 7	> 7	> 7
Cadmium in blood (CdB)[3]	≤ 5	> 5 and ≤ 10	> 10	> 10
Beta-2 (β_2MU)[4]	≤ 300	> 300 and ≤ 750	> 750	> 750
Trigger level	All three measurements at normal levels.	Any one measurement at an elevated level.	Any one measurement at a highly elevated level.	After confirmed follow-up testing within 90 days, either CdU or CdB remain at a highly elevated level, or β_2MU remains at a highly elevated level and either CdU or CdB is at an elevated level.
Risk at this level	Negligible or relatively low risk of renal tubular proteinuria (i.e., consistent with the background rate among the general population).	Elevated risk of renal tubular proteinuria (i.e., above the background level experienced by the general population).	Elevated, and perhaps highly elevated, risk of renal tubular proteinuria (i.e., above the background level experienced by the general population). Risk may not be abnormal if β_2MU is highly elevated and CdU and CdB are at normal levels.[5]	Highly elevated risk of renal tubular proteinuria.
Actions	Provide annual biological monitoring and biennial medical examinations.	Provide semi-annual biological monitoring and annual medical examinations until all measurements return to normal levels.	If medically removed from job: Provide quarterly biological monitoring and semiannual medical examinations until physician decides to return employee to job or permanently remove the employee from job. If not medically removed from job: Provide quarterly biological monitoring and semiannual medical examinations until all measurements return to normal levels.	Mandatory medical removal required. Provide quarterly biological monitoring and semiannual medical examinations until physician decides to return employee to job or permanently remove the employee from job.

[1] This table addresses only medical removal actions specified by the Cadmium standard; other requirements may apply based on the results of the other medical examinations.

[2] CdU = CdU µg per grCr

[3] β_2MU = β_2MU µg per grCrU

[4] CdB = CdB µg per lwb

[5] In cases in which the β_2MU is highly elevated and CdU and CdB are at normal levels, the physician should check to determine that the β_2MU levels accurately reflect the true β_2MU levels. If they do, then the physician must determine the cause of the highly elevated levels of proteins in urine (e.g., presence of end-stage renal disease or immune-deficiency diseases).

OSHA uses the biological measurements to determine whether mandatory medical removal is necessary. However, any one measurement for β_2MU, CdU, or CdB at highly elevated levels may trigger action by physicians. There are several potential scenarios. For example, one potential scenario is indicated in Table 1, column 4 (non-mandatory removal). In this example, if the physician does not medically remove the worker from the job, then the worker must receive quarterly biological monitoring and semiannual medical examinations until all parameters are within normal levels. If the physician decides to remove the employee from the job, the employer must provide quarterly biological monitoring and semiannual medical examinations until the physician decides to return the employee to the job or to permanently remove the employee from the job.

Another scenario is indicated in Table 1, column 5 (mandatory removal). In this scenario, OSHA requires mandatory medical removal when either CdU or CdB remains at highly elevated levels, or β_2MU remains at a highly elevated level and either CdU or CdB is at an elevated level, after follow-up testing at 90 days after initial testing. Additionally, employers are required to provide quarterly biological monitoring and semiannual medical examinations until the physician decides to return the worker to the job or to permanently remove the worker from the job.

Cadmium Biological Monitoring Advisor eTool

OSHA developed an eTool that allows physicians to input test results to aid them in deciding what course of action is best for the worker. The Advisor presents questions and relies on data from the biological monitoring tests to determine the appropriate course of action. It determines the biological monitoring and medical surveillance requirements of the General Industry Cadmium standard applicable to those results, and cites the applicable provisions of the Cadmium standard. The physician also may print the determinations and other information for future reference.

All the industry Cadmium standards use the same criteria to make determinations based on biological monitoring test results. However, the Advisor **does not** reference or cite the applicable provisions of the Construction Industry Cadmium standard, which is the only standard with different citations. Consequently, a physician using the Advisor in association with the Construction Industry Cadmium standard must find the corresponding provisions manually.

The Advisor also provides direct links to relevant provisions of the Cadmium standard in the Code of Federal Regulations, including the appendices. Links to requirements for periodic monitoring, reassessments, biological monitoring, definitions of terms, and a table comparing the General Industry and Construction Industry standards are also provided.

The link to the eTool is: http://webapps.dol.gov/elaws/osha/cadmium/1.aspx

DSG BR-3675 8/2013

Technology Transfer Network - Air Toxics Web Site

Cadmium Compounds (A)

Hazard Summary-Created in April 1992; Revised in January 2000

The main sources of cadmium in the air are the burning of fossil fuels such as coal or oil and the incineration of municipal waste. The acute (short-term) effects of cadmium in humans through inhalation exposure consist mainly of effects on the lung, such as pulmonary irritation. Chronic (long-term) inhalation or oral exposure to cadmium leads to a build-up of cadmium in the kidneys that can cause kidney disease. Cadmium has been shown to be a developmental toxicant in animals, resulting in fetal malformations and other effects, but no conclusive evidence exists in humans. An association between cadmium exposure and an increased risk of lung cancer has been reported from human studies, but these studies are inconclusive due to confounding factors. Animal studies have demonstrated an increase in lung cancer from long-term inhalation exposure to cadmium. EPA has classified cadmium as a Group B1, probable human carcinogen.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS), which contains information on oral chronic toxicity and the RfD, and the carcinogenic effects of cadmium including the unit cancer risk for inhalation exposure, and the Agency for Toxic Substances and Disease Registry's (ATSDR's) *Toxicological Profile for Cadmium*.

Uses

- Most cadmium used in the United States today is obtained as a byproduct from the smelting of zinc, lead, or copper ores. (1)

Cadmium is used to manufacture pigments and batteries and in the metal-plating and plastics industries. (1)

Sources and Potential Exposure

- The largest sources of airborne cadmium in the environment are the burning of fossil fuels such as coal or oil, and incineration of municipal waste materials. Cadmium may also be emitted into the air from zinc, lead, or copper smelters. (1)
- For nonsmokers, food is generally the largest source of cadmium exposure. Cadmium levels in some foods can be increased by the application of phosphate fertilizers or sewage sludge to farm fields. (1)
- Smoking is another important source of cadmium exposure. Smokers have about twice as much cadmium in their bodies as do nonsmokers. (1)

Assessing Personal Exposure

- The amount of cadmium present in blood or urine can be measured by atomic absorption spectrophotometry and used as an indication of cadmium exposure. (1)
- A more precise method, called neutron activation analysis, can be used to measure cadmium concentrations in the liver or kidney. (1)

Health Hazard Information

Acute Effects:

- Acute inhalation exposure to high levels of cadmium in humans may result in effects on the lung, such as bronchial and pulmonary irritation. A single acute exposure to high levels of cadmium can result in long-lasting impairment of lung function. (1,3,4)
- Cadmium is considered to have high acute toxicity, based on short-term animal tests in rats. (5)

Chronic Effects (Noncancer):

- Chronic inhalation and oral exposure of humans to cadmium results in a build-up of cadmium in the kidneys that can cause kidney disease, including proteinuria, a decrease in glomerular filtration rate, and an increased frequency of kidney stone formation. (1,3,4)
- Other effects noted in occupational settings from chronic exposure of humans to cadmium in air are effects on the lung, including bronchiolitis and emphysema. (1,3,4)
- Chronic inhalation or oral exposure of animals to cadmium results in effects on the kidney, liver, lung, bone, immune system, blood, and nervous system. (1,3)
- The Reference Dose (RfD) for cadmium in drinking water is 0.0005 milligrams per kilogram per day (mg/kg/d) and the RfD for dietary exposure to cadmium is 0.001 mg/kg/d; both are based on significant proteinuria in humans. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. It is not a direct estimator of risk, but rather a reference point to gauge the potential effects. At exposures increasingly greater than the RfD, the potential for adverse health effects increases. Lifetime exposure above the RfD does not imply that an adverse health effect would necessarily occur. (6)
- EPA has high confidence in both RfDs based primarily on a strong database for cadmium toxicity in humans and animals that also permits calculation of pharmacokinetic parameters of cadmium absorption, distribution, metabolism, and elimination. (6)
- EPA has not established a Reference Concentration (RfC) for cadmium. (6)
- The California Environmental Protection Agency (CalEPA) has established a chronic reference exposure level of 0.00001 milligrams per cubic meter (mg/m^3) for cadmium based on kidney and respiratory effects in humans. The CalEPA reference exposure level is a concentration at or below which adverse health effects are not likely to occur. (7)

Reproductive/Developmental Effects:

- Limited evidence exists for an association between inhalation exposure and a reduction in sperm number and viability in humans. (1)
- Human developmental studies on cadmium are limited, although there is some evidence to suggest that maternal cadmium exposure may result in decreased birthweights. (1)
- Animal studies provide evidence that cadmium has developmental effects, such as low fetal weight, skeletal malformations, interference with fetal metabolism, and impaired neurological development, via inhalation and oral exposure. (1,3,4)
- Limited animal data are available, although some reproductive effects, such as decreased reproduction and testicular damage, have been noted following oral exposures. (1)

Cancer Risk:

- Several occupational studies have reported an excess risk of lung cancer in humans from exposure to inhaled cadmium. However, the evidence is limited rather than

conclusive due to confounding factors (1,3,6)

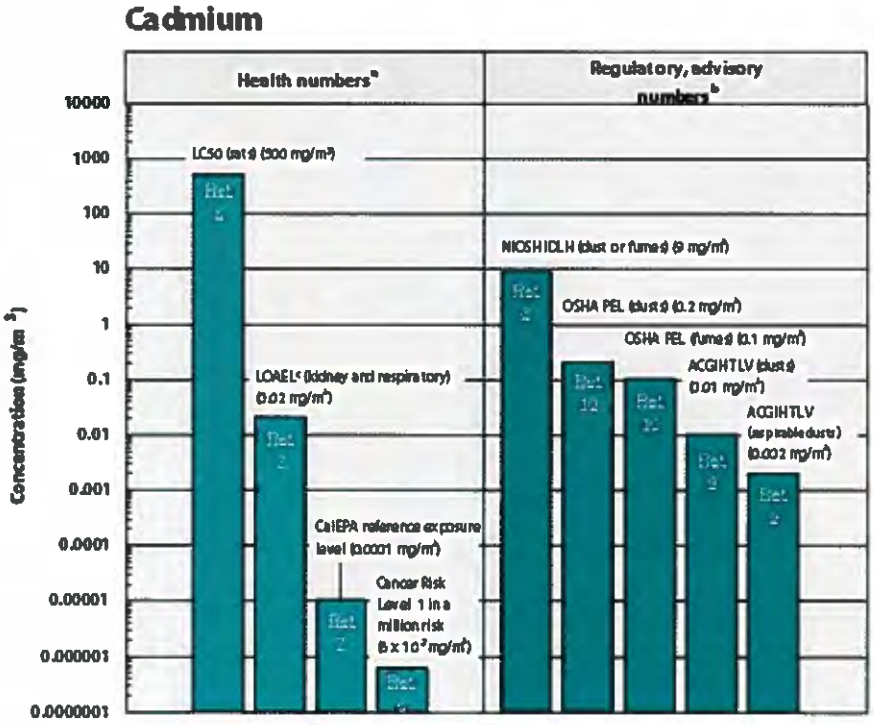
- Animal studies have reported cancer resulting from inhalation exposure to several forms of cadmium, while animal ingestion studies have not demonstrated cancer resulting from exposure to cadmium compounds. (1,3,6)
- EPA considers cadmium to be a probable human carcinogen (cancer-causing agent) and has classified it as a Group B1 carcinogen. (6)
- EPA uses mathematical models based on animal studies, to estimate the probability of a person developing cancer from breathing air containing a specified concentration of a chemical. EPA calculated an inhalation unit risk estimate of 1.8×10^{-3} $(\mu g/m^3)^{-1}$. EPA estimates that, if an individual were to continuously breathe air containing cadmium at an average of 0.0006 $\mu g/m^3$ (6×10^{-7} mg/m^3) over his or her entire lifetime, that person would theoretically have no more than a one-in-a-million increased chance of developing cancer as a direct result of breathing air containing this chemical. Similarly, EPA estimates that continuously breathing air containing 0.006 $\mu g/m^3$ (6×10^{-6} mg/m^3) would result in not greater than a one-in-a-hundred thousand increased chance of developing cancer, and air containing 0.06 $\mu g/m^3$ (6×10^{-5} mg/m^3) would result in not greater than a one-in-ten thousand increased chance of developing cancer. For a detailed discussion of confidence in the potency estimates, please see IRIS (6)

Physical Properties

- Cadmium is a soft silver-white metal that is usually found in combination with other elements. (1)
- Cadmium compounds range in solubility in water from quite soluble to practically insoluble. (1)
- The chemical symbol for cadmium is Cd and the atomic weight is 112.41 g/mol. (1)

Conversion Factors (only for the gaseous form):
To convert concentrations in air (at 25°C) from ppm to mg/m^3, mg/m^3 = (ppm) × (molecular weight of the compound)/(24.45). For cadmium: 1 ppm = 4.6 mg/m^3. To convert concentrations in air from $\mu g/m^3$ to mg/m^3, mg/m^3 = ($\mu g/m^3$) x (1 mg/1000 µg).

Health Data from Inhalation Exposure



ACGIH TLV–American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.
LC_{50} (Lethal Concentration$_{50}$)–A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.
NIOSH IDLH–National Institute of Occupational Safety and Health's immediately dangerous to life and health; NIOSH concentration representing the maximum level of a pollutant from which an individual could escape within 30 minutes without escape-impairing symptoms or irreversible health effects.
OSHA PEL–Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.
[a]Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.
[b]Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas NIOSH and ACGIH numbers are advisory.
[c]The LOAEL is from the critical study used as the basis for the CalEPA chronic reference exposure level.

References

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4. U.S. Department of Health and Human Services. Hazardous Substances Data Bank (HSDB, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
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8. National Institute for Occupational Safety and Health (NIOSH). *Pocket Guide to Chemical Hazards*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention. Cincinnati, OH. 1997.
9. American Conference of Governmental Industrial Hygienists (ACGIH). *1999 TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents. Biological Exposure Indices*. Cincinnati, OH. 1999.
10. Occupational Safety and Health Administration (OSHA). Occupational Safety and Health Standards, Toxic and Hazardous Substances. *Code of Federal Regulations*. 29 CFR 1910.1000. 1998.

A. * This fact sheet discusses cadmium and cadmium compounds. Most of the information is on cadmium, except in those cases where there are differences in toxicity between cadmium and cadmium compounds. In these cases, information on the cadmium compound is presented.

Last updated on 10/18/2013

PUBLIC HEALTH STATEMENT
Cadmium
CAS # 7440-43-9

Division of Toxicology and Human Health Sciences **September 2012**

This Public Health Statement is the summary chapter from the Toxicological Profile for cadmium. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-800-232-4636.

This public health statement tells you about cadmium and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Cadmium has been found in at least 1,014 of the 1,669 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which cadmium is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may be harmful.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to cadmium or cadmium compounds, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

PUBLIC HEALTH STATEMENT
Cadmium
CAS # 7440-43-9

Division of Toxicology and Human Health Sciences **September 2012**

What is cadmium?

Description	Metal found in the earth's crust, associated with zinc, lead, and copper ores. Pure cadmium is a soft, silver-white metal. Cadmium chloride and cadmium sulfate are soluble in water.
Uses • ***Manufacturing*** • ***Consumer products***	Most cadmium used in the United States is extracted as a byproduct during the production of other metals such as zinc, lead, or copper. Cadmium is also recovered from used batteries. Cadmium is used for the following: • batteries (83%) • pigments (8%) • coatings and platings (7%) • stabilizers for plastics (1.2%) • nonferrous alloys, photovoltaic devices, and other uses (0.8%)

What happens to cadmium when it enters the environment?

Sources	Cadmium is emitted to soil, water, and air by non-ferrous metal mining and refining, manufacture and application of phosphate fertilizers, fossil fuel combustion, and waste incineration and disposal. Cadmium can accumulate in aquatic organisms and agricultural crops.
Fate • ***Air***	Cadmium (as oxide, chloride, and sulfate) will exist in air as particles or vapors (from high temperature processes). It can be transported long distances in the atmosphere, where it will deposit (wet or dry) onto soils and water surfaces.
• ***Soil***	Cadmium and its compounds may travel through soil, but its mobility depends on several factors such as pH and amount of organic matter, which will vary depending on the local environment. Generally, cadmium binds strongly to organic matter where it will be immobile in soil and be taken up by plant life, eventually, entering the food supply.
• ***Water***	Cadmium exists as the hydrated ion or as ionic complexes with other inorganic or organic substances. Soluble forms migrate in water. Insoluble forms of cadmium are immobile and will deposit and absorb to sediments.

PUBLIC HEALTH STATEMENT
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CAS # 7440-43-9

Division of Toxicology and Human Health Sciences **September 2012**

How might I be exposed to cadmium?

Food and smoking—primary sources of exposure	In the United States, for nonsmokers the primary source of cadmium exposure is from the food supply. In general, leafy vegetables such as lettuce and spinach, potatoes and grains, peanuts, soybeans, and sunflower seeds contain high levels of cadmium, approximately 0.05–0.12 mg cadmium/kg. Tobacco leaves accumulate high levels of cadmium from the soil. The national geometric mean blood cadmium level for adults is 0.38 µg/L. A geometric mean blood cadmium level of 1.58 µg/L for New York City smokers has been reported. The amount of cadmium absorbed from smoking one pack of cigarettes per day is about 1–3 µg/day. Direct measurement of cadmium levels in body tissues confirms that smoking roughly doubles cadmium body burden in comparison to not smoking.
Air	Except for people living near cadmium-emitting industries, inhalation of cadmium is not expected to be a major concern.
Water	Elevated cadmium levels in water sources in the vicinity of cadmium emitting industries (historical and current) have been reported. Aquatic organisms will accumulate cadmium, possibly entering the food supply. People who fish in local waters as a means of food should be cautious and abide by any advisories.
Occupational exposure	Highest risk of exposure from processes involving heating cadmium containing materials such as smelting and electroplating. Risk will vary depending on the workplace. Major route of exposure is through inhalation of dust and fumes or incidental ingestion from contaminated hands, food, or cigarettes. Exposure can be controlled through personal protective equipment, good industrial hygiene practices, and control and reduction of cadmium emissions.

PUBLIC HEALTH STATEMENT
Cadmium
CAS # 7440-43-9

Division of Toxicology and Human Health Sciences **September 2012**

How can cadmium enter and leave my body?

Enter your body • ***Inhalation***	About 5–50% of the cadmium you breathe will enter your body through your lungs.
• ***Ingestion***	A small amount of the cadmium in food and water (about 1–10%) will enter your body through the digestive tract. If you do not have enough iron or other nutrients in your diet, you are likely to take up more cadmium from your food than usual.
• ***Dermal contact***	Virtually no cadmium enters your body through your skin.
Leave your body	Most of the cadmium that enters your body goes to your kidney and liver and can remain there for many years. A small portion of the cadmium that enters your body leaves slowly in urine and feces. Your body can change most cadmium to a form that is not harmful, but too much cadmium can overload the ability of your liver and kidney to change the cadmium to a harmless form.

How can cadmium affect my health?

This section looks at studies concerning potential health effects in animal and human studies.

Workers • ***Inhalation***	Breathing air with very high levels of cadmium can severely damage the lungs and may cause death. Breathing air with lower levels of cadmium over long periods of time (for years) results in a build-up of cadmium in the kidney, and if sufficiently high, may result in kidney disease.
Laboratory animals • ***Inhalation***	Damage to the lungs and nasal cavity has been observed in animals exposed to cadmium.
Humans • ***Oral***	Eating food or drinking water with very high cadmium levels severely irritates the stomach, leading to vomiting and diarrhea, and sometimes death. Eating lower levels of cadmium over a long period of time can lead to a build-up of cadmium in the kidneys. If the build-up of cadmium is high enough, it will damage the kidneys. Exposure to lower levels of cadmium for a long time can also cause bones to become fragile and break easily.
Laboratory animals • ***Oral***	Kidney and bone effects have also been observed in laboratory animals ingesting cadmium. Anemia, liver disease, and nerve or brain damage have been observed in animals eating or drinking cadmium. We have no good information on people to indicate what cadmium levels people would need to eat or drink to result in these diseases, or if they would occur at all.
Cancer	Lung cancer has been found in some studies of workers exposed to cadmium in the air and studies of rats that breathed in cadmium. The U.S. Department of Health and Human Services (DHHS) has determined that cadmium and cadmium compounds are known human carcinogens. The International Agency for Research on Cancer (IARC) has determined that cadmium is carcinogenic to humans. The EPA has determined that cadmium is a probable human carcinogen.

How can cadmium affect children?

This section discusses potential health effects in humans from exposures during the period from conception to maturity at 18 years of age.

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Effects in children	The health effects seen in children from exposure to toxic levels of cadmium are expected to be similar to the effects seen in adults (kidney and lung damage). Harmful effects on child development or behavior have not generally been seen in populations exposed to cadmium, but more research is needed. A few studies in animals indicate that younger animals absorb more cadmium than adults. Animal studies also indicate that the young are more susceptible than adults to a loss of bone and decreased bone strength from exposure to cadmium. Cadmium is found in breast milk and a small amount will enter the infant's body through breastfeeding. The amount of cadmium that can pass to the infant depends on how much exposure the mother may have had.
Birth defects	We do not know whether cadmium can cause birth defects in people. Studies in animals exposed to high enough levels of cadmium during pregnancy have resulted in harmful effects in the young. The nervous system appears to be the most sensitive target. Young animals exposed to cadmium before birth have shown effects on behavior and learning. There is also some information from animal studies that high enough exposures to cadmium before birth can reduce body weights and affect the skeleton in the developing young.

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CAS # 7440-43-9

How can families reduce the risk of exposure to cadmium?

Do not smoke tobacco products	Cadmium accumulates in tobacco leaves. The national geometric mean blood cadmium level for adults is 0.376 µg/L. Mean blood cadmium levels for heavy smokers have been reported as high as 1.58 µg/L.
Good occupational hygiene	Occupational exposure can be controlled through personal protective equipment, good industrial hygiene practices, and control and reduction of cadmium emissions. Children can be exposed to cadmium through parents who work in cadmium-emitting industries. Therefore, good hygiene practices such as bathing and changing clothes before returning home may help reduce the cadmium transported from the job to the home.
Avoid cadmium contaminated areas and food	Check and obey local fishing advisories before consuming fish or shellfish from local waterways. Avoid hazardous waste sites.
Proper disposal of cadmium containing products	Dispose of nickel-cadmium batteries properly. Many states have laws in effect that ban the disposal of batteries as municipal waste. Recycle old batteries whenever possible. Contact your local waste and recycling authority on how to properly dispose of paints and coatings.
Handle properly	Do not allow children to play with batteries. If mishandled, batteries could rupture. Children may also swallow small nickel-cadmium batteries.

If your doctor finds that you have been exposed to significant amounts of cadmium, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate.

PUBLIC HEALTH STATEMENT
Cadmium
CAS # 7440-43-9

Division of Toxicology and Human Health Sciences **September 2012**

Is there a medical test to determine whether I have been exposed to cadmium?

Detecting exposure	Cadmium can be measured in blood, urine, hair, or nails. Urinary cadmium has been shown to accurately reflect the amount of cadmium in the body.
Measuring exposure	The amount of cadmium in your blood shows your recent exposure to cadmium. The amount of cadmium in your urine shows both your recent and your past exposure. Cadmium levels in hair or nails are not as useful as an indication of when or how much cadmium you may have taken in, partly because cadmium from outside of your body may attach to the hair or nails. Tests are also available to measure the amount of cadmium inside your liver and kidneys.

What recommendations has the federal government made to protect human health?

The federal government develops regulations and recommendations to protect public health. Regulations *can* be enforced by law. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but *cannot* be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as "not-to-exceed" levels. These are levels of a toxic substance in air, water, soil, or food that do not exceed a critical value. This critical value is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are also updated periodically as more information becomes available.

For the most current information, check with the federal agency or organization that provides it. Some regulations and recommendations for cadmium include the following:

Drinking water	The EPA has determined that exposure to cadmium in drinking water at a concentration of 0.04 mg/L for up to 10 days is not expected to cause any adverse effects in a child. The EPA has determined that lifetime exposure to 0.005 mg/L cadmium in drinking water is not expected to cause any adverse effects.
Consumer products	The FDA has determined that cadmium levels in bottled water should not exceed 0.005 mg/L.
Workplace air	OSHA set a legal limit of 5 $\mu g/m^3$ cadmium in air averaged over an 8-hour work day.

Where can I get more information?

If you have any more questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below.

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

Toxicological profiles are also available on-line at www.atsdr.cdc.gov and on CD-ROM. You may request a copy of the ATSDR ToxProfiles™ CD-ROM by calling the toll-free information and

technical assistance number at 1-800-CDCINFO (1-800-232-4636), by e-mail at cdcinfo@cdc.gov, or by writing to:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
1600 Clifton Road NE
Mailstop F-57
Atlanta, GA 30333
Fax: 1-770-488-4178

Organizations for-profit may request copies of final Toxicological Profiles from the following:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 1-800-553-6847 or 1-703-605-6000
Web site: http://www.ntis.gov/

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World Health Organization

PREVENTING DISEASE THROUGH HEALTHY ENVIRONMENTS

EXPOSURE TO CADMIUM: A MAJOR PUBLIC HEALTH CONCERN

Cadmium exerts toxic effects on the kidney, the skeletal system and the respiratory system and is classified as a human carcinogen.[1,2] It is generally present in the environment at low levels; however, human activity has greatly increased those levels.[3] Cadmium can travel long distances from the source of emission by atmospheric transport.[4] It is readily accumulated in many organisms, notably molluscs and crustaceans. Lower concentrations are found in vegetables, cereals and starchy roots. Human exposure occurs mainly from consumption of contaminated food, active and passive inhalation of tobacco smoke and inhalation by workers in the non-ferrous metal industry.[2,5] National, regional and global actions are needed to decrease global environmental cadmium releases and reduce occupational and environmental exposure.

Sources of exposure to cadmium

Cadmium can be released to the environment in a number of ways, including:

- natural activities, such as volcanic activity (both on land and in the deep sea), weathering and erosion, and river transport;
- human activities, such as tobacco smoking, mining, smelting and refining of non-ferrous metals,[6] fossil fuel combustion, incineration of municipal waste (especially cadmium-containing batteries and plastics), manufacture of phosphate fertilizers, and recycling of cadmium-plated steel scrap and electric and electronic waste[7];
- remobilization of historic sources, such as the contamination of watercourses by drainage water from metal mines.

Cadmium releases can be carried to and deposited on areas remote from the sources of emission by means of long-range atmospheric transport.[6]

Industrial processes

Commercial cadmium production started only at the beginning of the 20th century. Initially, its main use was in electroplating, but since 1960, cadmium has been used for manufacturing nickel–cadmium batteries. Cadmium is also used in paint pigments, for electroplating and in making polyvinyl chloride plastics. The majority of cadmium present in the atmosphere is the result of human activities, especially smelting of non-ferrous metal ores, fossil fuel combustion and municipal waste incineration.[4] Soluble inorganic cadmium compounds are of greatest concern for occupational safety. Occupational exposure of workers in the non-ferrous smelting industry can be significant. Smelting and mining operations contaminate the aquatic environment, as does the effluent produced by air pollution control (gas scrubbers, in the absence of strict control measures). Atmospheric deposition of cadmium on arable soils exceeds its elimination in many countries, resulting in a gradual increase in cadmium levels in soils and crops.[4] Application of municipal sewage sludge to agricultural soil can also be a significant source of cadmium.[3]

Food and drinking-water

Cadmium contained in soil and water can be taken up by certain crops and aquatic organisms and accumulate in the food-chain.[4] Food constitutes the main environmental source of cadmium for non-smokers. Highest cadmium levels are found in the kidney and liver of mammals fed with cadmium-rich diets and in certain species of oysters, scallops, mussels and crustaceans. Lower cadmium concentrations are found in vegetables, cereals and starchy roots. Owing to the larger consumption of such food items, they represent the greater part of daily cadmium intake in most populations.[2,5] Some crops, such as rice, can accumulate high concentrations of cadmium if grown on cadmium-polluted soil. Acidification of cadmium-containing soils may increase the cadmium concentrations in crops.

Cadmium exposure from drinking-water is relatively unimportant compared with exposure from the diet. However, impurities in the zinc of galvanized pipes and solders in fittings, water heaters, water coolers and taps can sometimes lead to increased cadmium levels in drinking-water.

Smoking

The tobacco plant naturally accumulates relatively high concentrations of cadmium in its leaves. Thus, smoking tobacco is an important source of exposure, and the daily intake may exceed that from food in the case of heavy smokers. Cigarette smoking can cause significant increases in the concentrations of cadmium in the kidney, the main target organ for cadmium toxicity.

World Health Organization (WHO) cadmium guidelines
Provisional tolerable monthly intake (PTMI)
The Joint Food and Agriculture Organization of the United Nations (FAO)/WHO Expert Committee on Food Additives (JECFA) recently (in 2010) established a provisional tolerable monthly intake for cadmium of 25 µg/kg body weight.[5]
Drinking-water
3 µg/l[8,9]
Air
5 ng/m^3 (annual average)[6]

Health effects[2]

- The kidney is the critical target organ. Cadmium accumulates primarily in the kidneys, and its biological half-life in humans is 10–35 years.[9] This accumulation may lead to renal tubular dysfunction, which results in increased excretion of low molecular weight proteins in the urine. This is generally irreversible.
- High intake of cadmium can lead to disturbances in calcium metabolism and the formation of kidney stones. Softening of the bones and osteoporosis may occur in those exposed through living or working in cadmium-contaminated areas. In an area of Japan where soil has been contaminated with cadmium from zinc/lead mines, Itai-itai disease used to be widespread and is still seen in women over 50 years of age. It is

characterized by osteomalacia, osteoporosis, painful bone fractures and kidney dysfunction.

- High inhalation exposure to cadmium oxide fume results in acute pneumonitis with pulmonary oedema, which may be lethal. Long-term, high-level occupational exposure is associated with lung changes, primarily characterized by chronic obstructive airway disease.
- There is sufficient evidence that long-term occupational exposure to cadmium (e.g. through cadmium fume) contributes to the development of lung cancer. There is limited evidence that cadmium may also cause cancers of the kidney and prostate. The International Agency for Research on Cancer (IARC) has classified cadmium and cadmium compounds as *carcinogenic to humans* (Group 1), meaning that there is sufficient evidence for their carcinogenicity in humans.[10,11]

Risk mitigation recommendations

To decrease global environmental cadmium releases and reduce occupational and environmental exposure to cadmium and associated health effects, the following actions are needed:

- Prohibit smoking in public places.
- Reduce as far as is practicable emissions of cadmium—particularly into surface waters—from mining and smelting, waste incineration, application of sewage sludge to the land, and use of phosphate fertilizers and cadmium-containing manure. Develop techniques for the safe disposal of cadmium-containing wastes and effluents.
- Promote effective measures to increase recycling of cadmium and to restrict non-recyclable uses.
- Reduce cadmium exposure by, for instance, improving working conditions in the non-ferrous smelting industry and disseminating information on the proper use of fertilizers (which sometimes contain high levels of cadmium).
- Raise global awareness on the importance of minimizing waste discharges of cadmium.

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Public Health and Environment

World Health Organization

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Rhode Island Statutes

Title 24. Highways

Chapter 24-14. Junkyard Control Act

Current through 2012 Legislative Session

§ 24-14-1. Short title

This act may be cited as the "Junkyard Control Act."

Cite as R.I. Gen. Laws § 24-14-1

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-2. Declaration of policy

For the purpose of promoting the public safety, health, welfare, convenience, and enjoyment of public travel, to protect the public investment in public highways, and to preserve and enhance the scenic beauty of lands bordering public highways, it is hereby declared to be in the public interest to regulate and restrict the establishment, operation, and maintenance of junkyards in areas adjacent to the interstate and primary highways systems within this state. The general assembly hereby finds and declares that junkyards which do not conform to the requirements of this chapter are public nuisances.

Cite as R.I. Gen. Laws § 24-14-2

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-3. Definitions

(a) "Automobile junkyard" means any establishment or place where one or more unserviceable, discarded, worn out or junked automobiles or bodies, engines, tires, parts or accessories are gathered together.

(b) "Interstate system" means that portion of the national system of interstate and defense highways located within this state, as officially designated, or as may hereafter be so designated, by the director of transportation, and approved by the secretary of commerce, pursuant to the provisions of title 23, United States Code, Highways.

(c) "Junk" means old or scrap copper, brass, rope, rags, batteries, paper, trash, rubber debris, waste, or junked, dismantled, or wrecked automobiles, or parts thereof, iron, steel, and other old or scrap ferrous or nonferrous material.

(d) "Junkyard" means an establishment or place of business which is maintained, operated, or used for storing, keeping, buying, or selling junk, or for the maintenance or operation of an automobile junkyard and the term shall include garbage dumps and sanitary fills.

(e) "Primary system" means that portion of connected main highways, as officially designated, or as may hereafter be so designated, by the director of transportation, and approved by the secretary of commerce, pursuant to the provisions of title 23, United States Code, Highways.

Cite as R.I. Gen. Laws § 24-14-3

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-4. Junkyards prohibited

No person, firm, corporation or association shall establish, operate or maintain a junkyard, any portion of which is within one thousand feet (1000') of the nearest edge of the right-of-way of any interstate or primary highway, except the following:

(1) Those which are screened by natural objects, plantings, fences, or other appropriate means so as not to be visible from the main traveled way of the system, or otherwise removed from sight.

(2) Those located within areas which are zoned for industrial use under authority of law.

(3) Those located within unzoned industrial areas, which areas shall be determined from actual land uses and defined by regulations to be promulgated by the director of transportation.

(4) Those which are not visible from the main traveled way of the system.

Cite as R.I. Gen. Laws § 24-14-4

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-5. Junkyards lawfully in existence

Any junkyard lawfully in existence on May 6, 1966, or which is or may be lawfully established along any highway which is hereafter made a part of the interstate or primary systems and which has been so established before the inclusion of the highway within the interstate or primary systems and which is within one thousand feet (1000') of the nearest edge of the right-of-way and visible from the main traveled way of any highway on the interstate or primary system, shall be screened, if feasible, by the director of transportation at locations on the highway right-of-way or in areas acquired for such purposes outside the right-of-way so as not to be visible from the main traveled way of the highways; provided, however, that nothing contained herein shall be construed to relieve the owners or operators of automobile junkyards from the provisions of chapter 21 of title 5 relating to the screening thereof.

Cite as R.I. Gen. Laws § 24-14-5

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-6. Requirement as to screening

The director of transportation shall have the authority to promulgate rules and regulations governing the location, planting, construction, and maintenance, including the materials used in screening or fencing required by this chapter.

Cite as R.I. Gen. Laws § 24-14-6

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-7. Authority to acquire interest in land for removal and screening of junkyards

When the director of transportation determines that the topography of the land adjoining the highway will not permit adequate screening of the junkyards or the screening of the junkyards would not be economically feasible, the director of transportation shall have the authority to acquire by gift, purchase, or condemnation, such interests in lands as may be necessary to secure the relocation, removal, or disposal of the junkyards; and to pay for the costs of relocation, removal, or disposal, thereof. When the director of transportation determines that it is in the best interest of the state, the director may acquire such lands, or interests in lands, as may be necessary to provide adequate screening of the junkyards by gift, purchase or condemnation. The acquisition of lands or interests in lands under this section shall be made in accordance with the provisions of chapter 6 of title 37.

Cite as R.I. Gen. Laws § 24-14-7

History. P.L. 1966, ch. 118, § 1; P.L. 1989, ch. 542, § 72; P.L. 1997, ch. 326, § 156.

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§ 24-14-8. Injunction

The director of transportation may make application to the superior court in the county in which junkyards established or maintained in violation of this chapter may be located, for an injunction to abate the nuisances.

Cite as R.I. Gen. Laws § 24-14-8

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-9. Penalties

(a) It shall be a misdemeanor to operate or maintain a junkyard in violation of this chapter except those junkyards lawfully in existence on May 6, 1966.

(b) It shall be the duty of the state police and the police of the cities and towns to enforce this chapter, and any persons, firm, corporation or association violating this section shall, upon conviction of the first offense, be punished by a fine of not less than fifty dollars ($50.00) nor more than one hundred dollars ($100), or by imprisonment for not less than ten (10) days nor more than thirty (30) days, or both the fine and imprisonment, and shall for a second or subsequent conviction be fined not less than one hundred dollars ($100) nor more than five hundred dollars ($500), or by imprisonment for not less than thirty (30) days nor more than six (6) months, or by both the fine and imprisonment; provided, however, that any automobile junkyard violating this section and chapter 21 of title 5, shall be prosecuted in accordance with chapter 21 of title 5, and upon conviction be subject to the penalties provided in that chapter.

Cite as R.I. Gen. Laws § 24-14-9

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-10. Interpretation

Nothing in this chapter shall be construed to abrogate or affect the provisions of any lawful ordinance, regulation, or resolution, which is more restrictive than the provisions of this chapter.

Cite as R.I. Gen. Laws § 24-14-10

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-11. Agreements with the United States authorized

The director of transportation is hereby authorized to enter into agreements with the United States secretary of commerce as provided by title 23, United States Code, relating to the control of junkyards in areas adjacent to the interstate and primary systems, and to take action in the name of the state to comply with the terms of the agreement.

Cite as R.I. Gen. Laws § 24-14-11

History. P.L. 1966, ch. 118, § 1.

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§ 24-14-12. Severability

If any section, clause or provision of this chapter shall be held either unconstitutional or ineffective in whole or in part to the extent that it is not unconstitutional or ineffective, it shall be valid and effective and no other section, clause or provision shall on account of the invalidity be termed invalid or ineffective.

Cite as R.I. Gen. Laws § 24-14-12

History. P.L. 1966, ch. 118, § 1; P.L. 1997, ch. 326, § 156.

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West's Rhode Island Administrative Code
Title 61. Transportation Department
Division 1. General
Rule 11. Control of Junkyards Rules and Regulations (Refs & Annos)

R.I. Admin. Code 61-1-11:I
Alternatively cited as RI ADC 19 050 017

61-1-11:I. PURPOSE

Currentness

The purpose of these Rules and Regulations is to control the establishment, operation and maintenance of junkyards in accordance with the declaration of policy set forth by the Rhode Island General Assembly in enacting Chapter 24-14 of the General Laws of Rhode Island.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:I, RI ADC 61-1-11:I

End of Document

West's Rhode Island Administrative Code
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R.I. Admin. Code 61-1-11:II
Alternatively cited as RI ADC 19 050 017

61-1-11:II. APPLICATION

Currentness

These Rules and Regulations are applicable to all areas within 1,000 feet of the nearest edge of the right-of-way and visible from the main-traveled way of the Interstate and Federal-aid primary system of highways in the State of Rhode Island. These provisions apply regardless of whether Federal funds participated in the cost of such highways. Nothing contained in these Rules and Regulations shall prohibit a municipality from establishing regulations imposing stricter limitations.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:II, RI ADC 61-1-11:II

End of Document

West's Rhode Island Administrative Code
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Division 1. General
Rule 11. Control of Junkyards Rules and Regulations (Refs & Annos)

R.I. Admin. Code 61-1-11:III
Alternatively cited as RI ADC 19 050 017

61-1-11:III. DEFINITIONS

Currentness

A) Department means the Department of Transportation of the State of Rhode Island.

B) Industrial activities, for purposes of these regulations, shall mean those permitted only in industrial zones, or in less restrictive zones by the nearest zoning authority within the State, or prohibited by said authority but generally recognized as industrial by zoning authorities within the State, except that none of the following shall be considered industrial activities:

1) Outdoor advertising structures.

2) Agricultural, forestry, ranching, grazing, farming and related activities, including, but not limited to, wayside fresh produce stands.

3) Activities normally and regularly in operation less than 5 months of the year.

4) Transient or temporary activities.

5) Activities not visible for the traffic lanes of the main traveled way.

6) Activities more than 300 feet from the nearest edge of the main traveled way.

7) Activities conducted in a building principally used as a residence.

8) Railroad tracks, minor sidings, and passenger depots.

9) Junkyards as defined in Chapter 24-14.2 of the General Laws of Rhode Island.

C) Industrial Zones means those districts established by zoning authorities as being most appropriate for industry or manufacturing. A zone which simply permits certain industrial activities as an incident to the primary land use designation is not considered to be an industrial zone.

D) Interstate system means that portion of the national system of Interstate and defense highways located within this state, as officially designated, or as may hereafter be so designated, by the Director of Transportation, and approved by the U.S. Secretary of Transportation pursuant to the provision of title 23, United States code, "Highways."

E) Junk means old or scrap copper, brass, rope, rags, batteries, paper, trash, rubber debris, waste, or junked, dismantled, or wrecked automobiles and other motor vehicles, or parts thereof, iron, steel, and other old or scrap ferrous or nonferrous material.

F) Junkyard means establishment or place of business which is maintained, operated, or used for storing, keeping, buying, or selling junk, or for the maintenance or operation of an automobile and other motor vehicle junkyard. This definition includes scrap metal processors, auto-wrecking yards, salvage yards, scrap yards, auto-recycling yards, used auto parts yard and temporary storage of automobile bodies or parts awaiting disposal as a normal part of a business operation when the business will continually have like materials located on the premises. The definition includes garbage dumps and sanitary landfills.

1) Automobile junkyard means any establishment or place where one or more unserviceable, discarded, worn out or junked automobiles, or bodies, engines, tires, parts or accessories are gathered together.

2) Illegal junkyard means a junkyard which was established or is maintained in violation of the State law, Rules and Regulations, or local law or ordinance.

3) Nonconforming junkyard means a junkyard which was lawfully established, but which does not comply with the provisions of subsequent State law or regulations or which later fails to comply with law or regulations due to changed conditions.

G) Main-traveled way means the traveled way of a highway on which through traffic is carried. In the case of a divided highway, the traveled way of each of the separated roadways for traffic in opposite directions is a main-traveled way. It does not include such facilities as frontage roads, turning roadways or parking areas.

H) Municipality means a city or town in the State of Rhode Island.

I) Primary system means that portion of connected main highways, as officially designated, or as may hereafter be so designated by the Director of Transportation, and approved by the U.S. Secretary of Transportation, pursuant to the provisions of title 23, United States code, "Highways."

J) Right-of-way means the easement in or property acquired by the public through the Department of Transportation or its predecessors for the purposes of highway construction, safety rest areas, landscaping or any other purpose incidental to highway travel.

K) Scrap Processing Facility means any establishment having facilities for processing iron, steel, non-ferrous scrap, mineral wastes or slag, and whose principal produce is scrap iron, steel, or nonferrous scrap for sale for remelting purposes only.

L) Screening means the use of any vegetative planting, fencing, ornamental wall of masonry, or other architectural treatment, earthen embankment, or a combination of any of these which will effectively hide from view any deposit of junk from the main traveled way.

M) Unzoned industrial area shall mean the land occupied by the regularly used building, parking lot, storage or processing area of an industrial activity, and that land within 1,000 feet thereof which is -

1) Located on the same side of the highway as the principal part of said activity, and

2) Not predominantly used for residential or commercial purposes, and

3) Not zoned by State or local law, regulation or ordinance.

N) Visible means capable of being seen without visual aid by a person of normal visual acuity.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:III, RI ADC 61-1-11:III

End of Document

West's Rhode Island Administrative Code
Title 61. Transportation Department
Division 1. General
Rule 11. Control of Junkyards Rules and Regulations (Refs & Annos)

R.I. Admin. Code 61-1-11:IV
Alternatively cited as RI ADC 19 050 017

61-1-11:IV. JUNKYARDS PROHIBITED

Currentness

No person, firm, corporation or association shall establish, operate or maintain a junkyard, any portion of which is within one thousand (1,000) feet of the nearest edge of the right-of-way of any interstate or primary highway, except the following:

A) Those which are screened so as not to be visible from the main-traveled way.

B) Those located within areas which are zoned for industrial use, or

C) Those located within unzoned industrial areas.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:IV, RI ADC 61-1-11:IV

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Rule 11. Control of Junkyards Rules and Regulations (Refs & Annos)

R.I. Admin. Code 61-1-11:V
Alternatively cited as RI ADC 19 050 017

61-1-11:V. SCREENING

Currentness

A) Responsibility for Screening

1) Any junkyard lawfully in existence on May 6, 1966, the effective date of Chapter 24-14 of the General Laws of Rhode Island, or if later, the date on which the highway became part of the Interstate or Federal-aid primary system of highways, which is within one thousand (1,000) feet of the nearest edge of the right-of-way of a highway shall be screened, if physically and economically feasible by the Department at locations on the highway right-of-way or in areas acquired for such purposes outside the right-of-way, so as not to be visible from the main traveled way of the highway. Whenever the Department shall determine that screening prescribed for an existing junkyard is not physically or economically feasible, the Department shall remove, relocate or dispose of said junkyard after the payment of just compensation therefor.

Nothing contained herein shall be construed to relieve the owners or operators of automobile junkyards from the provisions of chapter 5-21 of the General Laws entitled, "Secondhand dealers," as amended relating to the screening thereof.

2) Junkyards established subsequent to May 6, 1966, or if later, the date on which the highway became part of the Interstate or Federal-aid primary system of highways, and located in areas subject to control by the Act and as contained in these rules and regulations must provide for adequate screening located off the highway right-of-way and at the expense of the person owning the junkyard. Screening must be of a type approved by the Department. Those junkyards that cannot be adequately screened shall be relocated at owner's expense.

The owner or owners or any junkyard or scrap processing facility shall submit a plan drawn to scale indicating how screening is to be accomplished. Such plan shall show the construction details of the screening to be used. When fencing is used alone or in combination with plant material, the results shall provide immediate screening. When planting is used along or in combination with an earthen embankment, the number, type, size and spacing of the plants shall be capable of screening the junk entirely from view. The ability of the proposed plant material to accomplish this goal shall be judged by the Department.

(a) The screening shall be located on the owner's land and not on any part of the highway right-of-way.

(b) The screen shall be in place prior to the time the junk is deposited.

(c) At no time after the screen is established shall the junk be stacked high enough to be visible above the screen. No junk shall be placed outside of the screened area or in areas not covered by license.

(d) Fences must be located in such a manner as to not be hazardous to the traveling public.

(e) The construction of fences shall be uniform and no patchwork type of construction shall be permitted.

(f) Fences shall be painted where the composition is such that painting is required. The paint used shall be of such color so as to blend into the environs of the highway right-of-way.

B) Acceptable Fencing Materials

Subject to the approval of the Department, acceptable fencing shall include fences of steel or other metals, durable woods such as heart cypress, redwood, or other wood treated with a preservative, or walls of masonry. Some of the types acceptable are:

1) Chain link type with aluminum, steel, plastic, or wooden slat inserts so as to prevent visibility through the fence.

2) Wooden types of basket weave, palisade, louver, or other suitable design.

3) Walls of masonry including plain or ornamental concrete block, block, brick, stone, or other suitable masonry material.

NOTE: The above types of fencing and walls are given for examples only. Any other design of fencing constructed of other materials may be submitted for consideration.

C) Plant Material

1) Plant materials indicated on the plans shall specify the botanical name of the plant materials used, the size at the time of planting, and the spacing between plants. All plant material shall be predominately evergreen and approved by the Department.

2) The requirements established by the American Nurserymen's Association as shown in their current publication entitled "American Standard for Nursery Stock" shall be in accord and govern grading, ball size, etc. for specific nursery stock used. Scientific and common names of plants shall be in conformity with the approved names in "Standardized Plant Names" (Current Edition) prepared by the American Joint Committee on Horticultural Nomenclature. Certificates of inspection of plant materials required by federal, state or other authority including the Rhode Island Department of Environmental Management licenses shall be procured prior to planting.

3) The minimum size of plant material at the time of planting shall be as follows:

Shade trees: 1# - 1 ½ # caliper (Decidious)

Multi-stem trees: 4# - 5# in height (Hawthorn, crape myrtle, etc.)

Evergreen trees: 4# - 5# in height (Pinus, magnolia, etc.)

Evergreen shrubs: 2 ½ # - 3# in height (including eleagnus, abelia, etc.)

4) Planting plans shall show plant pit size, back fill material used, planting and staking details.

D) Maintenance

The owner or owners of any junkyard shall maintain the screening established initially, doing such painting and repairs to keep any fences, walls or other structural material in good appearance. Plant material shall be watered, cultivated, or mulched, and given any required maintenance including spraying for insect control, to keep the planting in a good healthy condition. Dead plant material will be removed immediately and shall be replaced during the next spring or fall planting season following death. The replacement plants shall be at least as large as the initial planting.

E) Extension of Junkyards Screened by the Department

The owner or owners of any junkyard lawfully in existence on May 6, 1966, and which has been screened from view of the highway by the Department may not extend the deposit of junk beyond such screening so as to be visible from the main traveled way of the highway. Any such extension shall be screened by owner at his own expense and such screening shall be subject to these rules and regulations. Piling of junk above planned height of screening established by the Department is prohibited.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:V, RI ADC 61-1-11:V

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R.I. Admin. Code 61-1-11:VI
Alternatively cited as RI ADC 19 050 017

61-1-11:VI. MAINTENANCE OF NONCONFORMING JUNKYARDS

Currentness

A) The right to continue a nonconforming junkyard is not confined to any one individual or corporation so using the land. Thus, a nonconforming junkyard may be sold, leased, or otherwise transferred without affecting its status.

B) The nonconforming junkyard may continue as long as it is not extended, enlarged, or changed in use. Once a junkyard has been made conforming, the placement of junk so that it may be seen above or beyond a screen, or otherwise becomes visible, shall be treated the same as the establishment of a new junkyard.

C) The right to maintain a nonconforming junkyard shall be terminated if, for a period of three (3) months, the property is void of junk, or if, for a period of six (6) months, there is no additional junk placed on the site and no existing junk removed from the site.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:VI, RI ADC 61-1-11:VI

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R.I. Admin. Code 61-1-11:VII
Alternatively cited as RI ADC 19 050 017

61-1-11:VII. NONCOMPLIANCE

Currentness

The Department shall inspect all junkyards periodically to insure that they are being operated in accordance with applicable rules and regulations pertaining to junkyard control, and shall require that fences or plant material be maintained in such a manner as to accomplish the objective of these rules and regulations. If the inspection discloses that the junkyard is being operated in violation of these rules and regulations, the owner shall be informed in writing, by registered mail, stating the violation and instructing him to make the necessary corrections with 30 days from the date of the letter.

If the owner fails to take corrective action within 30 days, copies of all pertinent information will be submitted to the Department's Office of Special Counsel with the request that they make application to the Superior Court for an injunction to abate the nuisance.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:VII, RI ADC 61-1-11:VII

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R.I. Admin. Code 61-1-11:VIII
Alternatively cited as RI ADC 19 050 017

61-1-11:VIII. SEVERABILITY

Currentness

If any section, clause, or provision of these Rules and Regulations shall be held either unconstitutional or ineffective, to the extent that it is not unconstitutional or ineffective it shall be valid and effective, and no other section, clause, or provision shall on account thereof be termed invalid or ineffective.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:VIII, RI ADC 61-1-11:VIII

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R.I. Admin. Code 61-1-11:IX
Alternatively cited as RI ADC 19 050 017

61-1-11:IX. EFFECTIVE DATE

Currentness

These Rules and Regulations are hereby adopted by the undersigned on this _____ day of _____ A.D. 2001 and shall be effective twenty (20) days after filing a certified copy hereof in the Office of the Secretary of State.

Credits
Amended Dec. 2001.

Current with amendments received through January 31, 2013.

R.I. Admin. Code 61-1-11:IX, RI ADC 61-1-11:IX

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